MASTERPLAN 2015–2040

KEFLAVIK INTERNATIONAL AIRPORT

isavia

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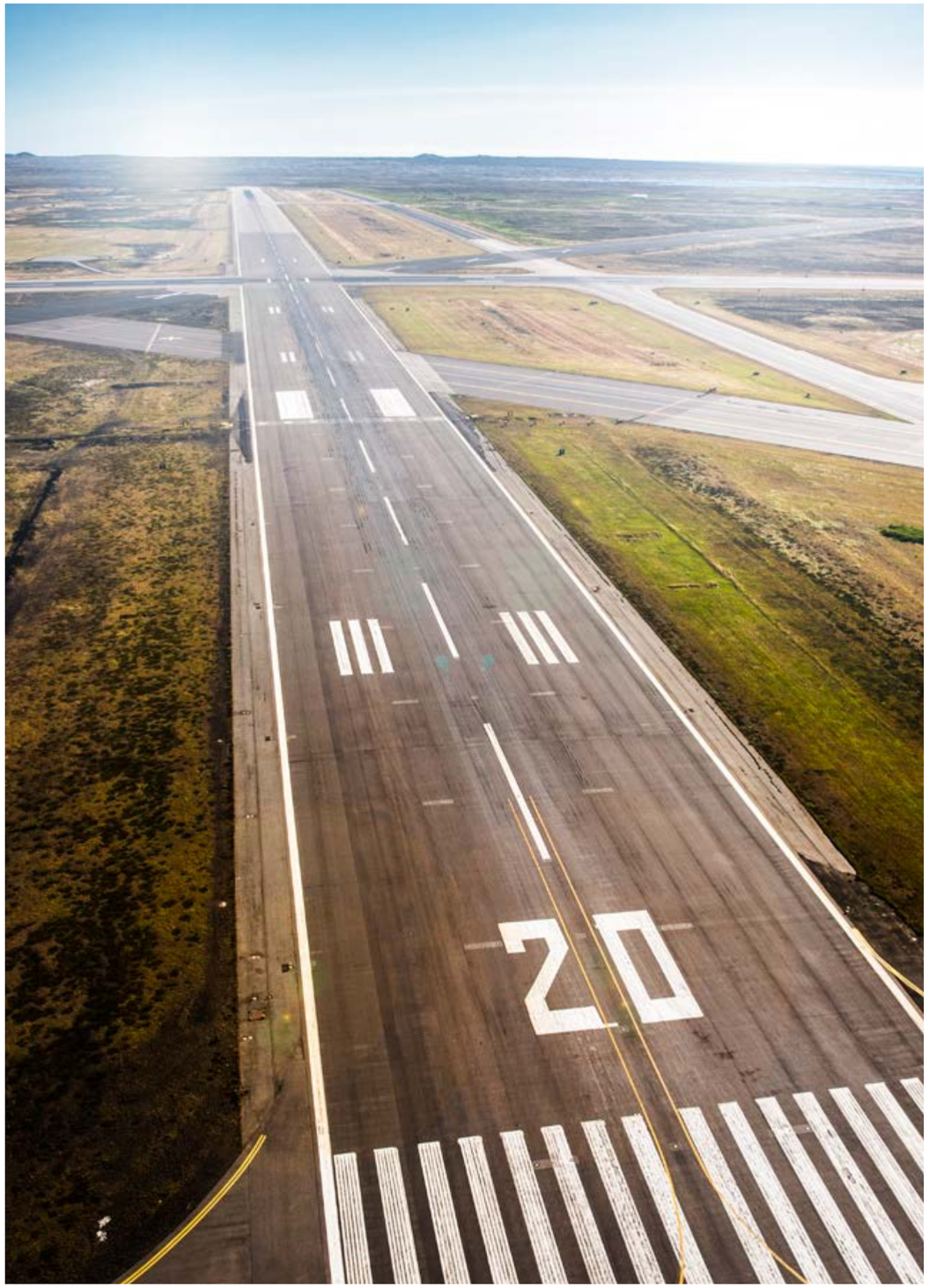
0.0
FOREWORD

As Iceland's main gateway, Keflavik International Airport provides the first experience of the country for most foreign visitors — whose numbers are fast rising. A strategically located hub serving transatlantic airline traffic and local population travel, the airport is growing at a rapid rate.

This Masterplan sets out a vision for the airport's future development. Based on a forecast of steep long-term growth in traffic and passenger numbers, the plan presents a staged approach to meet the resulting demand challenges - guided by the overarching principles of Safety, Logic, Financial Feasibility and Sustainability. Isavia aims to maintain the airport's status as a modern, well-functioning transport facility with sound future planning that meets the needs of all stakeholders. To this end, the proposed Masterplan comprises a Land Use Plan, a Terminal Plan and an Environmental Plan. All of these components are important for the airport's neighbouring communities, which are amongst key stakeholders with great prospects for employment and other opportunities.

We look with confidence towards the airport's future development based on the important roadmap offered by this Masterplan in terms of effective planning and implementation.

Björn Óli Hauksson
Chief Executive



1.0
INTRODUCTION TO THE MASTERPLAN

Recent years have seen rapid growth in passenger traffic through Keflavik International Airport. A new passenger and traffic forecast envisages continued substantial growth in the coming years. The passenger terminal is currently operating at capacity limits during peak hours. Planning for the airport has lacked an up-to-date land use plan. Although the airport has been able to deliver temporary solutions to meet present challenges, all airports whose traffic is growing at such a fast rate should have an up-to-date Masterplan to be able to build strategies and plan ahead, with due account of current traffic trends.

The preparation of this Masterplan involved numerous meetings and presentations for stakeholders. Isavia is mindful of the importance of responsible consultation with stakeholders and is committed to ongoing communication with interested parties on future improvements and changes to the Masterplan.

1.1
WHAT IS A MASTERPLAN?

A Masterplan is a guideline for airport authorities to make sound development decisions based on a carefully planned approach. The Masterplan has no statutory role under Icelandic law but has links with the airport's general plan and local plans, which are legislative. This Masterplan is of great importance for local stakeholders to understand how the airport may develop in the future. It takes account of growth in passenger and cargo traffic, detailed estimates of which have been made using information provided by the airport's key customers and on the basis of global trends.

A Masterplan for an airport located close to settlements has major significance for the future planning of neighbouring towns and villages. The local population relies on employment provided by the airport. In turn, the airport cannot operate without the local workforce. A synergistic synergetic and sustainable relationship between the airport and the neighbouring communities is thus essential, making it doubly important to minimise the airport's environmental impact.

Illustration showing the 4 Icelandic planning levels and how the Keflavik Airport Masterplan influences the different planning stages.

1.2
THE KEFLAVIK AIRPORT MASTERPLAN

The Keflavik Airport Masterplan provides guidance for the airport's future development, enabling it to expand and develop in a logical, sustainable and cost-effective manner. It serves as the basis for decision-making as airport traffic increases, and provides the ability to respond to external factors and operational requirements. The Masterplan provides the airport's owner with certainty that plans are made according to a longterm strategy and sets out a flexible operating framework until the year 2040 and beyond. It provides investors and stakeholders with an overview of potential development and investment opportunities. Furthermore, it is a foundation for consultation with the local community, business partners and others.

The Masterplan sets out the proposed development of Keflavik Airport until its annual throughput reaches 13.8 million passengers. In recent years, the airport has seen a substantial rise in passenger numbers, of more than 65% since 2012. The traffic forecast indicates that the airport's passenger throughput will reach 4.5 million in 2015, with the transit passenger ratio surpassing 30%.

The 2015–2040 Keflavik Airport Masterplan was developed by Isavia Ltd in co-operation with the Norwegian architectural firm Nordic - Office of Architecture, which in partnership with the Danish engineering firm Cowi A/S won a design contest held by Isavia in the winter of 2014–2015. The Icelandic planning consultancy firm Alta Consulting also contributed to the Masterplan, in particular with regard to environmental aspects and Icelandic planning guidance.

This Masterplan presents the design guidelines and strategies set out by Isavia for Keflavik Airport on the basis of Nordic's design proposal. It will be reviewed regularly and updated in line with traffic trends.

On the basis of current conditions at Keflavik Airport, the Masterplan focuses largely on a phased development of the terminal building (Terminal Plan), with particular emphasis on increased stand allocation and providing ample space for passengers inside the terminal. It incorporates a Land Use Plan designed to meet the requirements for expected airfield movements based on the airport's prime customers' operation models. The Masterplan also proposes possible land use development areas outside the airfield boundaries and adjacent to the airport's east apron. Finally, it introduces an Environmental Plan with a view to meeting local and global environmental standards for modern airports, such as with respect to noise, CO_2 emissions, pollution control and waste handling.

THE MASTERPLAN IS:

- A VISION FOR THE AIRPORT'S LONGTERM DEVELOPMENT
- A PLAN FOR RESOURCES TO MEET CURRENT AND FUTURE NEEDS
- A DEVELOPMENT GUIDE FOR DECISION-MAKERS REGARDING AIRPORT IMPROVEMENTS
- A SOURCE FOR CONSULTATION WITH STAKEHOLDERS
- A DEVELOPMENT GUIDE FOR NEIGHBOURING COMMUNITIES AND STAKEHOLDERS
- AN ENVIRONMENTAL PLAN FOR THE OPERATION AND DEVELOPMENT OF KEFLAVIK AIRPORT

1.3
CONTENT OF THE MASTERPLAN

The Masterplan consists of the following plans:

- LAND USE PLAN: The Land Use Plan provides guidance for the airfield's sustainable development. Its aim is to ensure that adequate land is available to meet future aviation requirements. The plan gives an indication of locations for airport services and proposed development plans for each airport zone. The Land Use Plan consists of a zoning plan, an airfield plan and development plan for the airport's eastern apron.

- TERMINAL PLAN: The Terminal Plan focuses on the future growth in traffic and passenger numbers and sets out proposed development of infrastructure and resources. Included in the terminal layout are areas reserved for check-in, ticket counters, security checkpoints, departure lounges, commercial areas, airline operations, baggage handling systems and other necessary facilities. The Terminal Plan safeguards space and allows for the expansion of facilities to meet growth up to and beyond the time horizon of the current passenger and traffic forecast. The Terminal Plan is proposed as a staged approach with each stage accommodating forecast passenger numbers and stand demand. The existing terminal area's viability was analysed in depth with regard to location, access, long-term development potential, flexibility and cost as well as operations during construction work and was found to be a very feasible option for future development.

- ENVIRONMENTAL PLAN: The Environmental Plan provides a strategy for the airport's operations based on its location and environmental conditions. Noise-related issues, air quality, waste management, water resources and climate change are the main focus areas concerning the airport's environmental sustainability.

1.4
KEFLAVIK AIRPORT

Keflavik Airport is located on the Reykjanes peninsula, a 40-minute drive from Reykjavík's city centre and seven minutes from the town of Reykjanesbær. Sitting astride the North Atlantic route linking Europe and North America, the airport is of major importance for technical stops and as an alternate airport in the North Atlantic as well as for polar routes.

Keflavik Airport serves as the primary gateway to Iceland, welcoming 96% of travellers and saying farewell to almost

every Icelander leaving the country. It is also an important hub for airlines between America and Europe, being strategically located between the two continents and providing fast connections and minimal transfer times over the North Atlantic. Isavia Ltd is the state-owned operator of Keflavik Airport and other airports in Iceland.

Isavia is responsible for ensuring the airport's future development in line with passenger and traffic forecasts in co-operation with client airlines. Tourism being one of Iceland's three main industries, a plan for developing the country's premier gateway is obviously of key importance for the nation's economy.

In addition to Keflavik Airport's role as the main gateway linking Icelanders to the outside world and vice versa, its role as a hub between two continents has major significance for the airport's future development. Traffic, peak demands and future changes must develop within a scheme that offers alternative development and has the flexibility to meet unforeseen needs.

The Masterplan was developed in consultation with the airport's stakeholders on the basis of an initial analysis of its existing operations, the traffic forecast and the existing building mass. The result is a plan designed to optimise the use of the existing facilities whilst minimising operational disturbances during construction.

- A safe, economically efficient and environmentally sustainable Masterplan that meets the needs of its users and stakeholders

The Masterplan's key aims for the airport's development are to:

- Meet the demands of the traffic forecast by increasing the number of aircraft stands and other facilities

- Propose a staged development approach to enable construction to meet current demands

- Provide information for regulatory authorities and local and regional planners

- Provide a strategy for efficient use and upgrade of existing runway and taxiway infrastructure to increase runway capacity

- Ensure that facilities such as for parking, ground handling and catering are optimally located to suit functional requirements

- Plan for general aviation (GA), maintenance and technical facilities

- Propose an environmental plan to guide the airport's sustainable development.

// In Keflavik Airport's 2015–2040 Environmental Plan, we set out our framework for minimising the airport's environmental impacts. We will strive to manage its growth whilst maintaining a balance between its social and economic benefits on the one hand and its environmental impacts and future development on the other hand.

PHOTO FROM KEFLAVIK AIRPORT (1950)

1.5
THE HISTORY OF KEFLAVIK AIRPORT

Keflavik Airport remained a joint Icelandic civilian airport and U.S. Naval Air Station until 30 September 2006. Originally known as Meeks Field, the airport was constructed by American armed forces during World War II for military purposes. One of world's largest airports at the time, it played a major role in Allied transatlantic aviation and convoy protection during the war. It later gained an important function as a refuelling stop, thus developing the commercial North Atlantic route between Europe and North America.

The advent of commercial jetliners in the 1960s dramatically increased the range of commercial aircraft. Keflavik became less important as a refuelling stop for international carriers, but retained its importance as an alternate field on this busy route. The Icelandic airline operators Loftleiðir Icelandic, which pioneered a transatlantic route between New York and Luxembourg via Iceland in the 1950s, and Flugfélag Íslands (Icelandair), which operated on European routes only, initially operated from Reykjavík. At the dawn of the jet age, both companies moved their international operations to Keflavik. They later merged as "Icelandair".

The Leifur Eiríksson International Air Terminal was inaugurated in April 1987 and was extended in 2001 in compliance with the Schengen Convention, which established a single external European frontier. Improvements and expansion of terminal facilities continued, with a 16,500m2 extension completed in early 2008. The terminal is currently being extended, including six additional bus gates and improvements to and expansion of various areas within the building.

Keflavik Airport remained a civilian airport and a military base operated jointly by the Keflavik International Airport Authority and the U.S. Navy until 2006, when the United States withdrew all forces from Iceland after the military threat in the North Atlantic subsided. The Keflavik Airport Authority assumed sole operation of all aviation facilities at Keflavik and was subsequently incorporated into the state-owned limited company Isavia, which also operates all airport and navigational aids facilities in Iceland.

Keflavik Airport covers an area of about 2500 hectares and is located west of the town of Reykjanesbær and southwest of Reykjavík. The current airport area consists of the terminal and cargo area, runways and taxiways, ground transport (passenger and staff parking, car rental facilities, drop-off and pick-up areas and bus and fly bus areas). Other areas include general aviation, airport service, airspace control and air safety, a military area and other functions.

PHOTO FROM KEFLAVIK AIRPORT (1948)

PHOTO FROM KEFLAVIK AIRPORT TERMINAL (1945)

2.0
FORECASTS - THE BASIS FOR OUR MASTERPLAN

This 2015-2040 Masterplan is based on a forecast prepared by Isavia in co-operation with stakeholders in Keflavik Airport. Due regard was also had to the Aviation Activity Forecast provided by the consulting firm Leigh Fisher in November 2014.

Forecasts of aviation activity are presented for passengers, air cargo and aircraft operations. Peak hour forecasts, stand demand forecasts, car parking forecasts and public transport forecasts for the airport are also presented.

2.1
HISTORIC PASSENGER, AIRCRAFT AND FREIGHT MOVEMENTS

Passenger traffic at Keflavik Airport grew by an average of 8.1% per year between 2005 and 2014. This period includes the global financial crisis of 2008 and 2009 and the subsequent recovery period. Traffic volumes fell significantly during the global financial crisis, or by an average of 13% between 2007 and 2009. Since 2009, however, traffic has rebounded strongly, growing by an average of 16.2% per year between 2010 and 2014. In the same period, the number of commercial movements increased at an average annual rate of 5.1%.

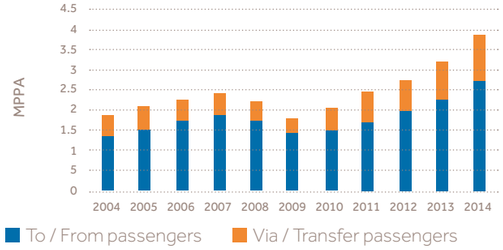
2.2
ANNUAL PASSENGER AND AIRCRAFT MOVEMENT FORECASTS

Long-term forecasting typically incorporates both macro- and microeconomic factors affecting demand at airports. In this forecast, however, the main focus is a bottom-up approach driven by microeconomic factors such as:

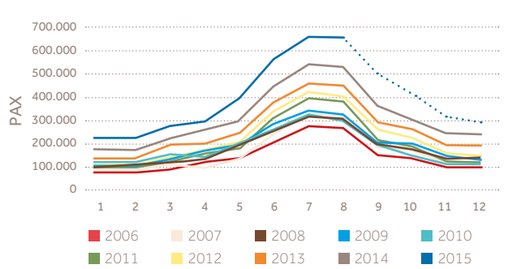
- Existing airlines serving the market;
- Future fleet plans of airlines serving Keflavik Airport.

The bottom-up approach was applied to the years 2016-2025. For the remainder of the forecast period, a combination of forecasts from Boeing and Airbus was applied up to the year 2040.

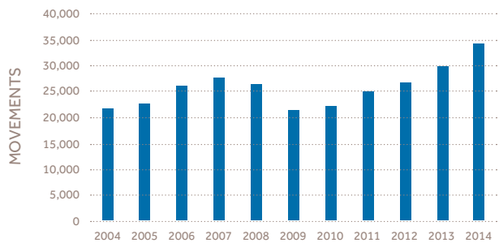
The forecast envisages annual passenger numbers more than tripling from 4.5 million in 2015 to about 14 million in 2040. The forecast average annual growth rate is 4.6%. Commercial aircraft movements are expected to more than double in number from 35,000 currently to 86,000 in 2040.



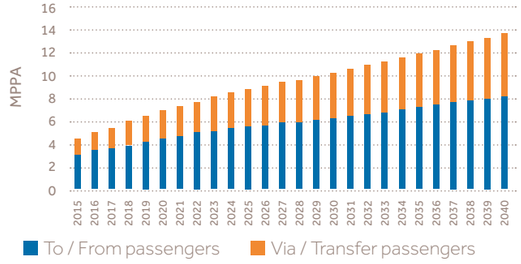
The diagram shows historic passenger traffic



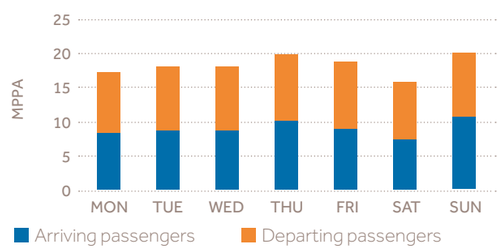
The diagram shows passenger traffic seasonality



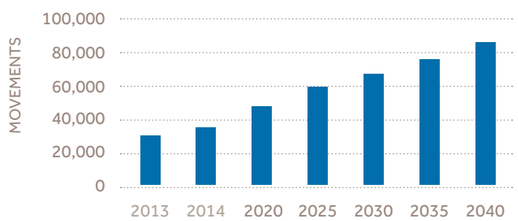
The diagram shows historic aircraft and freight movements



The diagram shows the passenger traffic forecast



The diagram shows the passenger profile during a busy week at Keflavik Airport



The diagram shows the aircraft and freight movement forecast

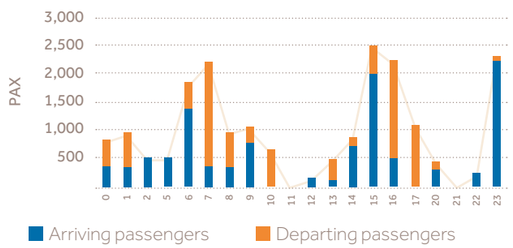
2.3 PEAK-HOUR FORECASTS

Traffic at Keflavik Airport is characterised by three large daily peaks — in the morning, afternoon and around midnight — as well as high seasonality. The number of departing passengers within the terminal at peak hours can reach 3,000. Both of Iceland's two largest airlines aim to increase their transfer traffic, meaning that the peaks will grow even larger.

This has major significance for the airport's planning and design under the Masterplan's timeframe with regard to the size of the terminal and other facilities, such as the apron and car park.

The forecast shows the development of the peak-hour number of departing passengers at Keflavik.

The diagrams below show the total number of passengers travelling through Keflavik Airport on 3 August 2014 – the busiest day of that year in its busiest week of 28 July to 3 August.

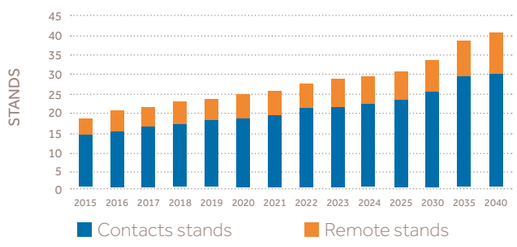


The diagram shows the passenger profile during a busy day at Keflavik Airport

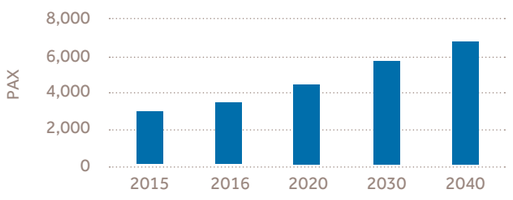
2.4 AIRCRAFT STAND FORECASTS

Keflavik Airport currently has 24 stands available near the terminal: 12 contact stands and 12 remote stands. The airport has mainly two peaks each day — in the early morning and the afternoon. At these times, there is a shortage of stands.

According to our main stakeholders' fleet plans, the airport needs to have 40 stands available in 2040. The diagram below shows the stand demand for each year until 2040.



The diagram shows the stand demand forecast



The diagram shows the forecast for the peak-hour profile

2.5 CARGO FORECAST

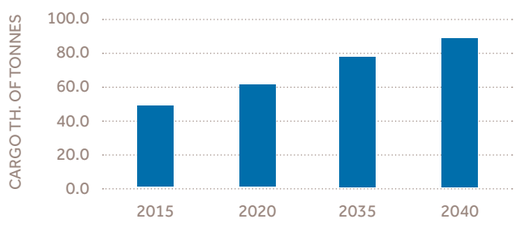
For the cargo tonnage forecast, historical information was analysed together with interviews with the current cargo operators. The following factors were also considered:

- The amount of freight carried on passenger aircraft compared with freight aircraft

- Demand for air cargo and supply of air cargo capacity in the form of passenger belly space and all-cargo freighters at Keflavik Airport

Cargo volumes are generally related to GDP. KEF appears to be no exception in this regard, with an average annual growth rate of 3.4% in cargo tonnage between 1998 and 2013, compared to a corresponding GDP growth rate of 2.5%.

The forecast envisages an increase in annual freight volumes from 48,000 tonnes currently to more than 88,000 tonnes in 2040.



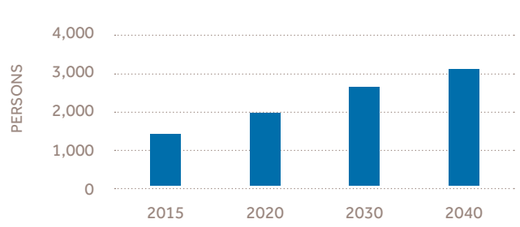
The diagram shows the cargo forecast

2.6 CAR PARKING FORECASTS

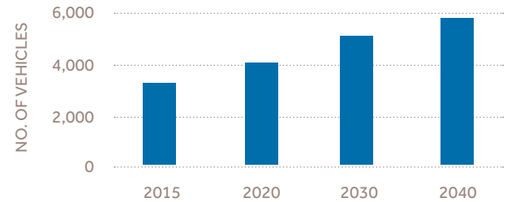
To calculate the airport's future car parking requirements, the following services were considered: arrivals short-stay parking, departures short-stay parking, long-stay parking, rental cars and staff.

The diagram below shows the forecast for required car parks and the public transport forecast.

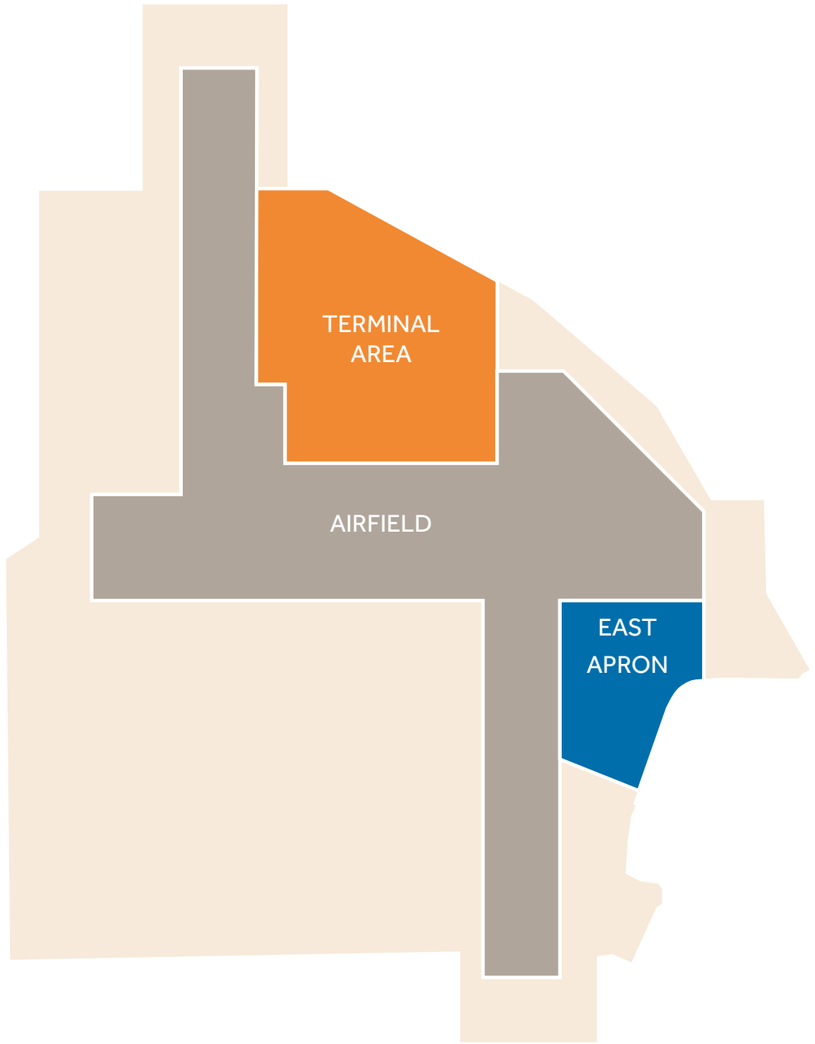
Based on the current number of users and projected growth, we estimate that the number of airport users requiring public transport (bus and shuttle) is likely grow at approximately 4% per year until 2040. Currently, about 46% of direct passengers use public transport to get to and from Keflavik Airport, and this percentage is projected to rise to 56% by 2040.



The diagram shows the public transport user forecast



The diagram shows the car parking forecast



KEFLAVIK AIRPORT ZONING PLAN

3.0
LAND USE PLAN

The Land Use Plan gives a holistic view of the airport area. Its aim is to ensure that sufficient and adequate land is available to meet air transport requirements in the future. The Land Use Plan provides an indication of land use requirements for various services and future development in the airport area.

The Land Use Plan sets out different areas and zones planned for future development at the airport. These include runways, the apron, technical service areas, the terminal area, parking, etc.

The Land Use Plan lays out three main areas (see diagram) that have been developed to secure the airport's future development.

3.1
AIRFIELD

The airport is well equipped with two intersecting runways - RWY 02/20 (3054 x 60m) and RWY 11/29 (3065 x 60m) - and features modern passenger and commercial facilities as well as extensive aircraft operation areas. All approaches are free of obstruction and the airport is equipped with advanced approach systems. Runways 11 and 20 are Category II; runways 02 and 29 are Category I. The airport serves all types of aircraft 24 hours a day, with 29,300 commercial movements annually and 4,800 general aviation and military movements in 2014.

Keflavik Airport's runway and taxiway system has been analysed with a view to the anticipated increase in aircraft movements.

3.1.1
EXISTING RUNWAYS

The existing active runways at Keflavik Airport are RWY 02/20 and RWY 11/29, which have the following characteristics:

Designation	Dimensions	Lighting	Precision approach	Code
02	3,054 x 60 m	* Runway Threshold ID lights	CAT I	4E
20	3,054 x 60 m	LIH W CL 900 m LIH R sidebars 275 m LIH W Crossbars 150 m 300 m seq. fl. CL	CAT II	4E
11	3,065x 60 m	LIH W CL 900 m LIH R sidebars 275 m LIH W Crossbars 150 m 300 m seq. fl. CL	CAT II	4E
29	3,065x 60 m	*LIHW CL 300m + Crossbar	CAT I	4E

* Relating to planned upgrades

Traffic statistics indicate the following runway use:

RWY	2007 MASTERPLAN DATA	2014 DATA
02	33%	25%
20	30%	40%
11	24%	25%
29	13%	10%

Apart from the abovementioned upgrades to the approach lighting system, the existing runways will remain unchanged with regard to length and width in the Land Use Plan.

// We aim to limit and reduce noise impact wherever possible by locating future runways and airport activities as far away from residential areas as possible. Another aim is to minimise non-essential use of APUs and establish a noise monitoring system at the airport.

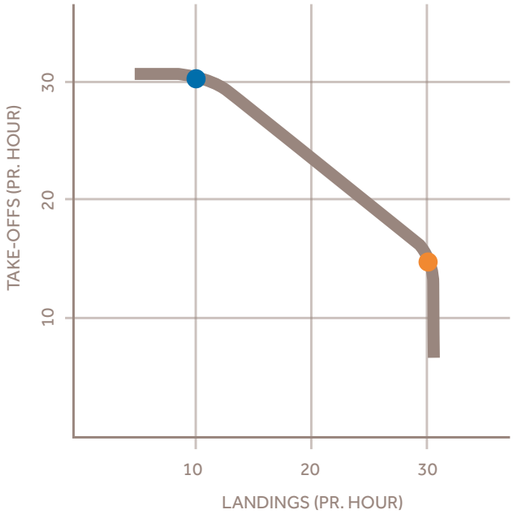
3.1.2 INCREASING RUNWAY CAPACITY

The current flight schedule includes very distinctive peaks where one hour is devoted almost entirely to landings followed by an hour of take-offs almost exclusively. This clear separation between landings and take-offs places constraints on runway capacity due to the required distance between arriving and departing aircraft.

Decisions regarding a third runway at Keflavik will be driven by:

- the number of aircraft movements at peak hours;
- the mix of take-offs and landings using the runway; and,
- the mix of aircraft types (light, medium and heavy)

The figure below shows the capacity of a single runway with a mix of take-offs and landings. A runway clearly has greater capacity when landings can be interspersed with take-offs.



The capacity line as drawn in the figure could be raised for Keflavik if the following two requirements are met:

- A mix of aircraft types with fewer light/medium aircraft following heavy aircraft. This may reduce wake turbulence separation overall and bring the number of take-offs to approximately 37 per hour.

- Rapid exit taxiways could increase the number of landings to approximately 33-35 movements per hour through reduced runway occupancy times.

This information generally concurs with a runway capacity study completed in 2007.

Actions that can delay the need for a third runway are tabulated below.

VARIABLE	ACTION ON VARIABLE TO DELAY THIRD RUNWAY
Number of aircraft movements in an hour	Spread peak-hour movements into the shoulders of the peak (preceding and following hour)
Mix of take-offs and landings	A schedule which allows take-offs to be interpersed between landings
Mix of aircraft types	Reduce number of light/medium following heavy situations
Runway occupancy time	Rapid exit taxiway for landing aircraft

The Land Use Plan includes the following measures to enable delaying the construction of the third runway:

To increase runway capacity, rapid exit taxiways (RETs) are proposed for the existing runways 11/29 and 02/20. The positioning of the RETs has been calculated using ICAO's three-segment method and a fleet mix of code C and E aircraft. The assumption is made that the exit will be located in the 'best-fit' position for the greatest number of aircraft. The best-fit location for the exit is determined to be 1800m. An extra take-off entrance taxiway is also planned for existing runways 20 and 11. All entrances are planned as 90 degree entrances, as ICAO no longer recommends rapid entry taxiways owing to runway incursion issues.

3.1.3 NEW RUNWAY

A new runway parallel to the existing RWY 02/20 (designated as 02L/20R) is planned west of the terminal with a separation of 2,170m to the existing parallel RWY, providing the ability to perform independent parallel operations.

The 02/20 direction is chosen for the new runway since this direction is used for 65% of the airport's current movements.

The proposed new runway under the Masterplan has a length of 2.500m and is a code 4E RWY.

Designation	Dimentions	Lighting	Precision approach	Code
02 L	2.500 x 45 m	LIH W CL 900 m LIH R sidebars 275 m LIH W Crossbars 150 m 300 m seq. fl. CL	CAT II	4E
20 R	2.500x 45 m	LIH W CL 900 m LIH R sidebars 275 m LIH W Crossbars 150 m 300 m seq. fl. CL	CAT II	4E

The parallel runway system's primary mode of operation is proposed as a mixed mode. Staggering will be optimised to minimise taxi times and fuel consumption during taxiing. The new runway is placed to the north of the existing RWY 11/29, which will involve land acquisition to the north of the existing aerodrome boundary.

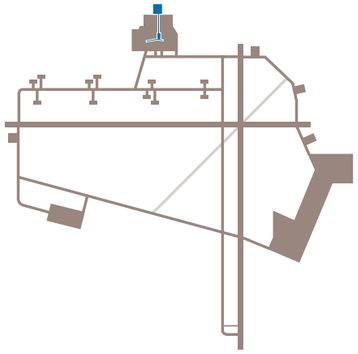
The runway length has been determined using assumptions based on design aircraft type; range to destinations; and the aerodrome environment (temperature, elevation and runway slope).

A runway length of 2,400m accommodates the vast majority of civil aircraft movements (with flights to maximum-range destinations either slightly payload-restricted or required to use the existing 3,000m runway). Some military operations may require a runway length of at least 2,500m.

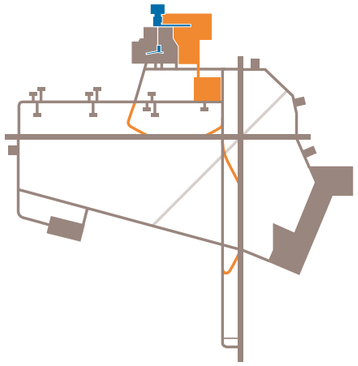
//

A guiding principle for the airport's development is to reuse or redevelop existing structures, including the existing terminal, runways and taxiways. Another key deliverable is to design flexible buildings and infrastructure that can adapt easily to changed functions, and to locate these with due consideration to environmental impacts.

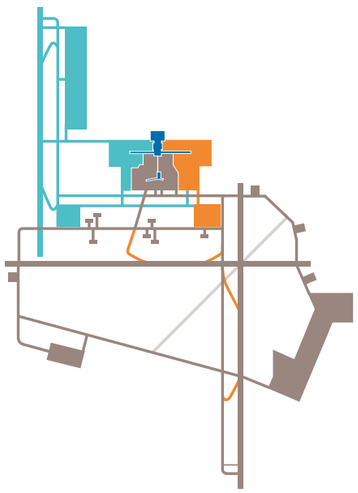
Examples:
The new third runway will be located near the terminal to minimise taxiing distances and away from settlements to curb noise.
Offering facilities such as for cargo, catering and ground handling as close to the terminal as possible will minimise transport distances, fuel use and CO_2 emissions.



Existing aprons, RWY and TWY system



The diagram shows apron development, de-icing platform and rapid exit taxiways.



The diagram shows a fully developed apron area, RWY and TWY system according to the Masterplan.

3.1.4 TAXIWAYS

The new runway 02L/20R will be served by a new full-length parallel taxiway on its eastern side. Two entrances to the runway and a rapid exit taxiway for each landing direction are planned. Centrally, a 90-degree entrance/exit is planned for the relatively large segment of General Aviation and smaller aircraft types. The existing runway, to be designated 02R/20L, and the new runway 02L/20R will be linked east-west with the passenger terminal area and the existing maintenance area by two parallel cross-taxiways. The existing taxiways will be included as part of one of those two cross-taxiways. Existing taxiways will also link the two runways.

3.1.5 APRON

A minimum of 75% of the summer peak traffic will be operated using contact stands, i.e. without a bus service for passengers. In addition to contact stands, areas have been allocated for the construction of remote aircraft parking, providing further capacity when needed. Some of these remote stands are under construction to cater for increased traffic until the first phase of the terminal expansion comes into operation. A 75% service level at Keflavik Airport during summer traffic should mean 100% contact stand service in winter.

Ten code C stands will be located on the north side of the pier north, distributed evenly on the east and west wing. The east wing stands are served by an aircraft stand taxi lane around the east end of the pier, while the west wing stands are served by an aircraft stand taxi lane around the west end of the pier.

A mix of code C/D/E stands are proposed on the south side of the pier north.

A full code E and code C aircraft stand taxi lane is planned in the area between pier north and pier south. The two taxi lanes can be used simultaneously for the assigned aircraft types. At each end of pier north, a paved area is allocated for push-back and start-up of aircraft without disrupting operations on the two taxi lanes between the piers.

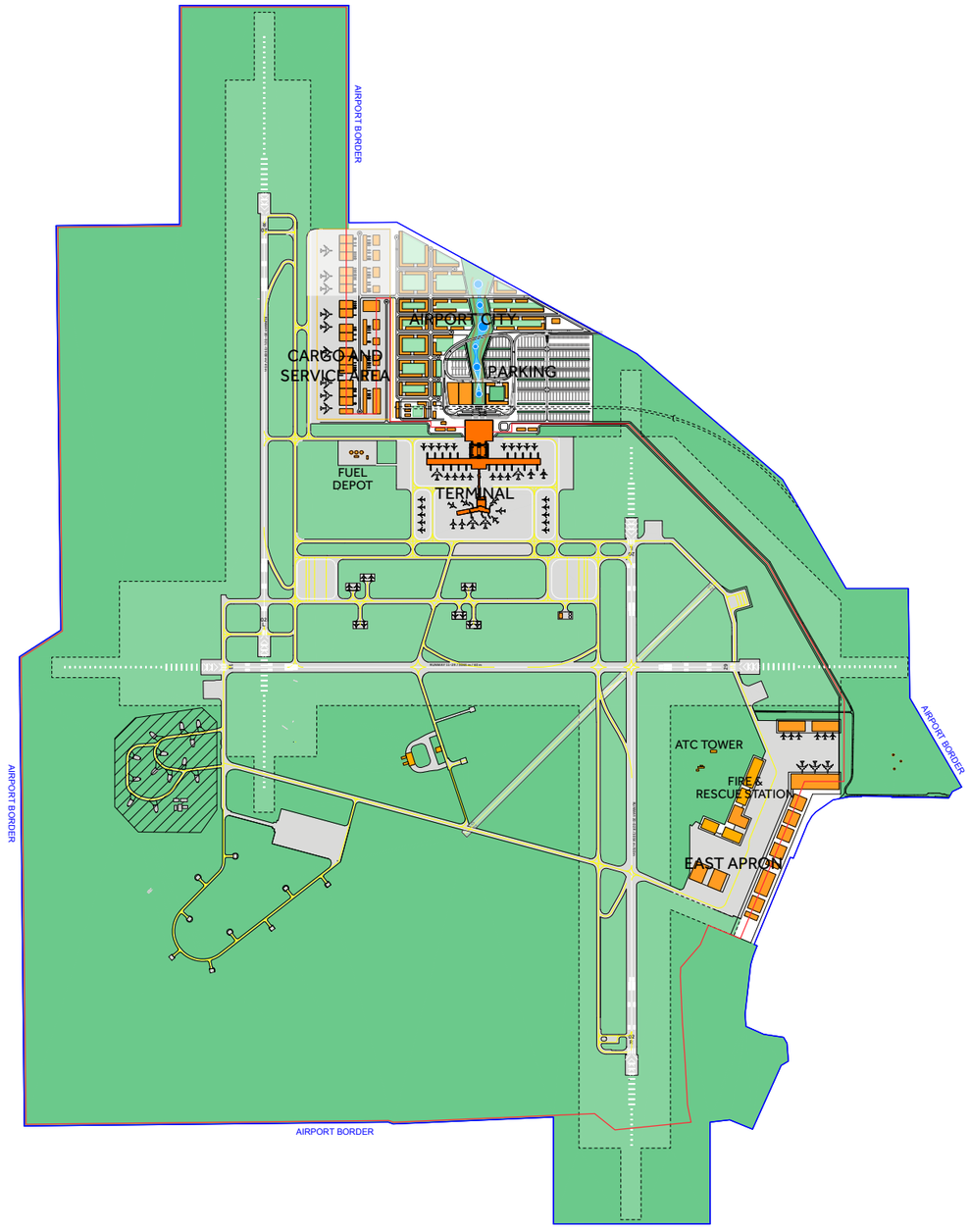
3.1.6 DE-ICING

For environmental and operational reasons, de-icing operations are moved away from the apron. An eastern de-icing platform will be constructed at an early stage and a western de-icing area platform will follow. The western de-icing platform will be located conveniently for the new parallel runway 02L/20R. The capacity of each de-icing platform provides simultaneous de-icing of, e.g., two code C and one code E aircraft, or two code E aircraft. The western de-icing platform may need to be constructed earlier than the parallel runway to meet de-icing demand.

By operating on designated de-icing/anti-icing platforms, collection and recycling of fluid run-off will be achievable. Further operational benefits will be obtained in terms of reduced stand-occupation time, shorter taxi distances to take-off and improved efficiency of equipment.

Ultimately, when a future runway is constructed, the western de-icing platform will serve both RWY 11 and RWY 02L/20R.

// We will prevent de-icing fluids from entering the groundwater or sewage system and construct two separate sites for de-icing of aircraft.



KEFLAVIK AIRPORT 2040 LAND USE PLAN

3.1.7 AIRFIELD FIRE AND RESCUE STATION

The Land Use Plan identifies a site on the east apron for a fire rescue station. A satellite station will be required to meet response times to the threshold of RWY 20R. One option for the location of this satellite station is in the new cargo and service area. In addition to providing better proximity to 20R, this location can also support fast response to the terminal area. Locating a support satellite station at the western apron would require the cargo facility layout to accommodate the building at the southern end of the cargo precinct for those purposes.

3.1.8 ATC TOWER

The existing ATC Tower will not meet present ICAO/FAA visibility requirements for a new 02L/20R runway. To provide sufficient visibility of all six runway ends, the taxiway system and the aprons, a new ATC tower will be required in conjunction with the new runway. There is allocated area for an alternative location of the ATC tower on the north side of the terminal building.

Alternative options exist for ATC tower locations. However in the life of this MasterplanPlan, technology will assumably allow remote tower operations via camera technology to the point where this can be adopted rather than a visual control tower.

3.1.9 FUEL SUPPLY

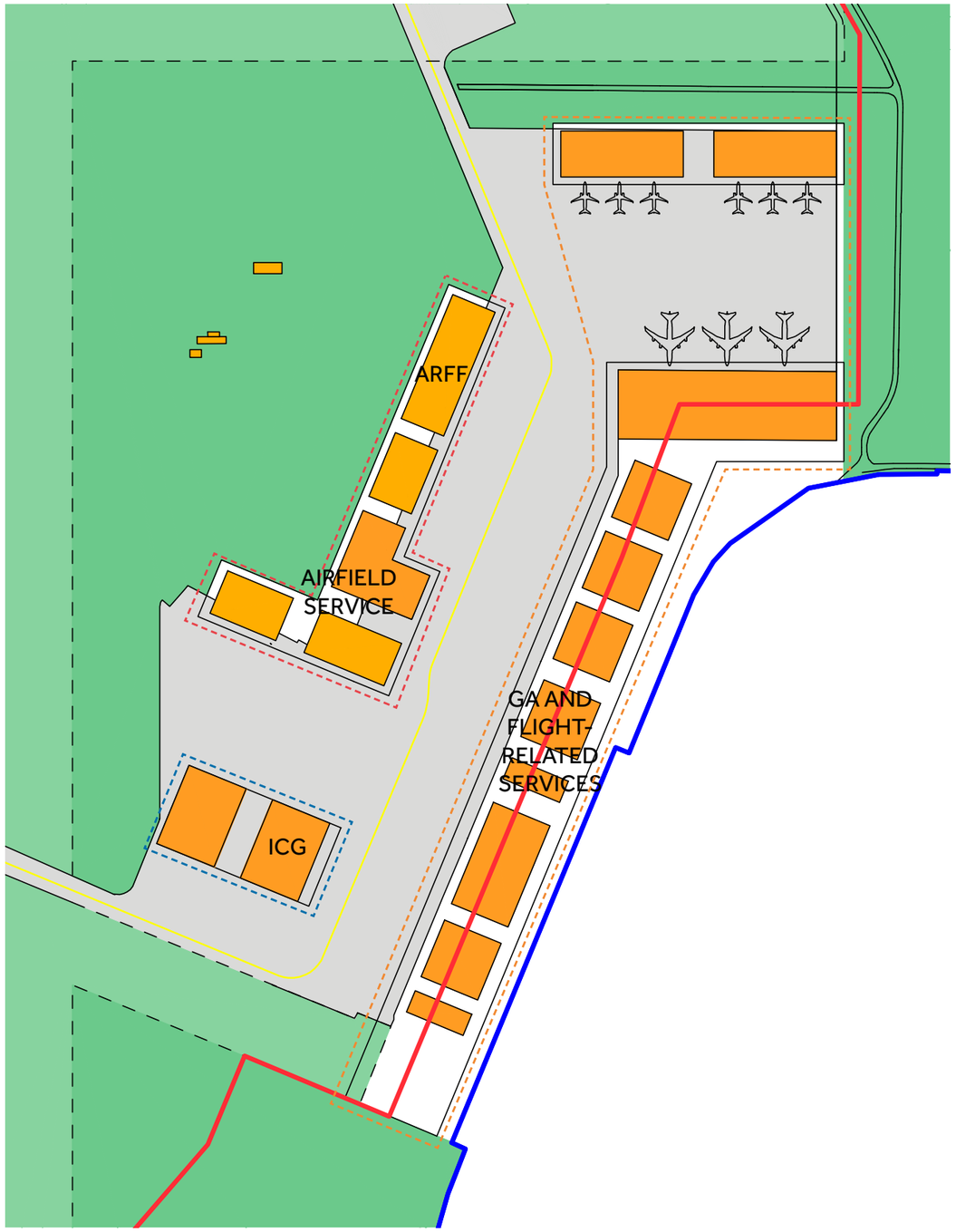
The civil fuel farm in its current location is sufficiently distant for the planned apron expansion. It does not have to be relocated, and serves the apron well in its present location.

3.1.10 CARGO, GROUND HANDLING, CATERING AND MAINTENANCE

It is proposed to relocate cargo, ground handling, catering and maintenance facilities to the north-west side of the terminal area. This shortens transport distances to the terminal and apron while freeing space around the terminal for future development of passenger-related traffic activities. Isavia is mindful of the potential in cargo-related services from Keflavik Airport and aims to develop a practical cargo area in co-operation with its stakeholders.

Aircraft maintenance requiring hangar facilities in the foreseeable future will be performed at Keflavik Airport for the largest carriers with aircraft based at Keflavik Airport. The area north-west of the terminal presents possibilities for an increase in maintenance facilities. The area will have good connections to the runway and taxiway system. The facilities will have landside access, which will increase flexibility and usage of the buildings. Additional equipment-parking facilities for ground handling are proposed north of the terminal apron.

Future development of aircraft maintenance and related services could be viable on the east apron. The area is optimal for business activities linked to day-to-day passenger traffic. It has respectable size with already existing infrastructure and is well located for airside and landside access. It would be feasible and beneficial from an economic and environmental point of view to make more use of the east apron.



EAST APRON DEVELOPMENT

3.2 EAST APRON

The east apron has been designed as a highly flexible area encouraging future development. The apron itself is the biggest asset of the area and the Masterplan proposes zones to be developed around the existing apron. The area is divided into three zones with clear functions and good access.

--- Keflavik airports technical services are currently located in the buildings on the north/west part of the east apron. This area is within the airport boundaries and will require security clearance for all persons. This area can be developed further by reusing existing structures or with new buildings.

--- The Icelandic Coast Guard's existing facilities are in direct contact with the apron and close to the runway system. Future development is proposed to the north/west of the existing building if required.

--- General aviation facilities are currently located at the east apron. Future development for general aviation can be located on the border of airside and landside. This would be beneficial for general aviation operators, flight-schools and other development, which will benefit from flexible usage, access and control.

Several other airport-related businesses can be developed at the east apron.

EAST APRON DEVELOPMENT / PHASE 1

Development areas

// We aim to continuously reduce CO_2 emissions from our own vehicles and machines. The aim is for our vehicle fuel and energy use to be carbon-neutral.
- We aim to minimise CO_2 emissions from our activities.
- We will encourage our contractors to use sustainable practices in major construction projects, including standards such as BREEAM or LEED.
- We will develop a CO_2 inventory and work towards CO_2 accreditation.

4.0
TERMINAL PLAN

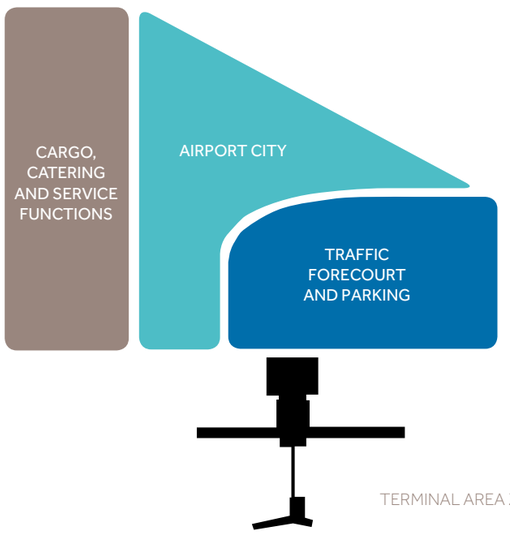
The airport's role as a hub between two continents is a key factor for its future development. Daily operations with large peak demands set the requirements for stand demand and flexibility. Seasonality at Keflavik Airport is high although traffic patterns have in recent years tended to spread slightly throughout the year. The Terminal Plan sets out development that meets the demands of the traffic forecast as well as ensuring that further development beyond the Masterplan's time horizon can take place, by safeguarding areas and planning under a long-term strategy.

4.1
ACCESS, PARKING AND TRAFFIC FORECOURT

Reykjanesbraut is the main access road to and from the airport. From this road, a new branch road must be developed to the airport service area. Access to the airport city development area branches off the passenger terminal road at a roundabout. The traffic loop is proposed as a large one-way circuit, which simplifies traffic to and from the airport. The traffic forecourt is the main element of the traffic loop along the north side of the new terminal extension, with separated levels for departing and arriving passengers. The traffic loop simplifies access and provides safety for public transport, pedestrians, cyclists, taxis and private cars. Car-parking facilities, hotels and short-term parking areas are proposed within the traffic loop. Long-term parking areas are located outside the traffic loop.

The recommendation is made that the traffic forecourt is constructed on two levels: the upper level for departing passengers and the lower for arriving. This eliminates one vertical movement for departing passengers and provides a longer kerbside for drop-off and pick-up. For terminals processing 8-10 million passengers per year, vertical separation of landside traffic into departures and arrivals is recommended by airport design guidelines (ICAO, IATA, ACI and FAA). This is to avoid long walking distances and intersecting traffic. To avoid vehicular and pedestrian conflicts, a pedestrian passage below ground can be developed. Construction of a two-level forecourt along the north facade will leave minimal operational constraints on the existing terminal during construction.

Private cars should be restricted to short drop-off points at departure level. Arrivals pick-up and short term parking for departures are recommended to be routed to the parking area north of the terminal to reduce traffic on the forecourt. Taxis and buses enter the traffic forecourt on the appropriate level and move from one level to the other by the traffic loop. Taxis and buses will be limited to certain parking areas. A waiting area for buses and taxis is established within the parking area east of the traffic loop.



TERMINAL AREA ZONING DIAGRAM

Short- and medium-term parking is located inside the traffic loop. A multi-storey car park is proposed, providing parking for 1700 cars. Other locations for multi-storey car parking are available within the traffic loop. A dedicated area in the multi-storey car park will be for rental cars and related facilities. Long-term parking and staff parking will be located east of the traffic loop.

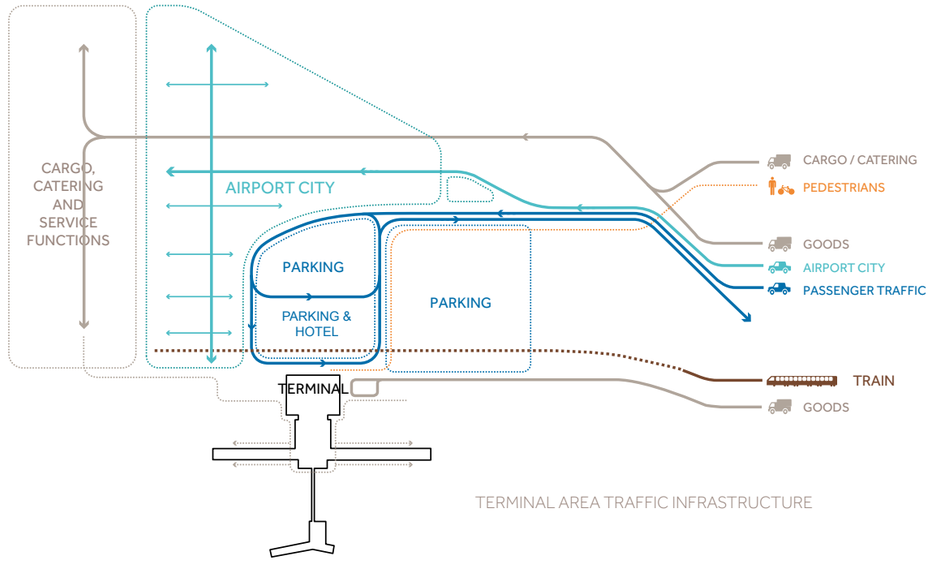
The number of parking spaces that can be provided meets requirements to 2040 and beyond.

4.2
RAIL CONNECTION

The feasibility of a high-speed rail connection between Keflavik Airport and Reykjavik city centre is being studied in Iceland, focusing primarily on social and environmental benefits as well as traffic safety.

The Masterplan accommodates a rail line to the airport, whose terminus is envisaged at the north side of the new terminal. The proposed location of the rail station building is on a level below the lower traffic forecourt. The rail line is planned to be double-tracked.

In the event of the terminal and rail being constructed at different stages, adequate measures should be taken to enable the future construction of a rail line.



TERMINAL AREA TRAFFIC INFRASTRUCTURE

Year	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040
MPPA	4,5	5,1	5,5	6,0	6,5	7,0	7,4	7,8	8,2	8,5	8,9	9,1	9,4	9,7	10	10,3	10,6	10,9	11,2	11,6	11,9	12,3	12,7	13	13,4	13,8
Total stand demand	18	20	21	22	23	24	25	27	28	29	30	31	32	32	33	33	34	35	36	37	38	38	39	39	40	40
Contact 75 %	14	15	16	17	18	18	19	21	21	22	23	24	24	24	25	25	26	27	27	28	29	29	30	30	30	30
Remote * 25 %	4	5	5	5	5	6	6	6	7	7	7	7	8	8	8	8	8	8	9	9	9	9	9	9	10	10
*																										
Situaton 2015																										
Contact stands		13	12	13	13																					
Remote stands		5	8	9	10																					
Phase 1						22	22	22	22	22		26	26	26	26	26	26									
Contact stands						22	22	22	22	22		26	26	26	26	26	26									
Remote stands						2	3	5	6	7		4	6	6	7	7	8									
Phase 2																										
Contact stands																										
Remote stands																										
Phase 3																										
Contact stands																										
Remote stands																										
Baggage claim belts																										
Existing layout	3	3	3	3	3																					
Phase 1 north building						5	5	5	5	5	7	7	7	7	7	7	7	9	9	9	9	9	9	9	9	9
Phase 2 north building																										
Phase 3 north building																										

KEY FIGURES / BASIS FOR THE DIMENSIONING OF THE AIRPORT TERMINAL

* Level of service: Isavia's strategy for split between contact and remote stands.

4.3 TERMINAL

The existing terminal building has been developed in several phases over the past decades. The north and south buildings have two main passenger levels. The corridor between the two buildings has only one level. The terminal has approximately 61,000m² floor area, which is relatively large compared with the current yearly passenger throughput but not sufficient to meet the forecast traffic peaks. The current peak pattern has resulted in the terminal already operating at the limit of its capacity.

This Masterplan proposes safeguarded areas around the terminal building based on design parameters outlined in the following chapter.

4.3.1 TERMINAL DEVELOPMENT

The Terminal Plan aims to provide easy orientation, intuitive wayfinding and minimal direction- and level-changes. It includes a northward expansion of the north building (a new passenger terminal), a north/east pier and subsequently a north/west pier.

Various development options have been considered, including constructing a new terminal elsewhere in the airfield. The proposed design focuses on making efficient use of resources and features provided by the existing building by expanding floor areas and reorganising logistics.

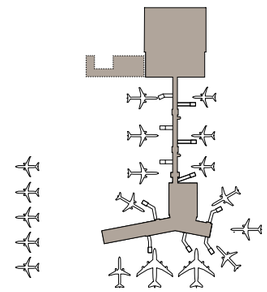
4.3.2 NEW PASSENGER TERMINAL

The building will consist of two main floors for passengers and possibly a secondary mezzanine. The ground floor contains a new baggage claim hall, customs, various services and a landside arrivals hall. The number of baggage claim carousels determines the width of the north building. The first floor will house future check-in and bag-drop facilities as well as the central security check.

The northward expansion of the north building will be constructed on a landside building site, which greatly simplifies building processes. The Terminal Plan provides for relocation of existing sculptures in the terminal area.

The expansion can be designed with a connection to the existing terminal, respecting its architectural qualities and minimising the need to reconstruct the existing building. The connection between the new and existing buildings will provide the option to increase the floor-to-floor height in the new north terminal to accommodate technical infrastructure and baggage handling systems.

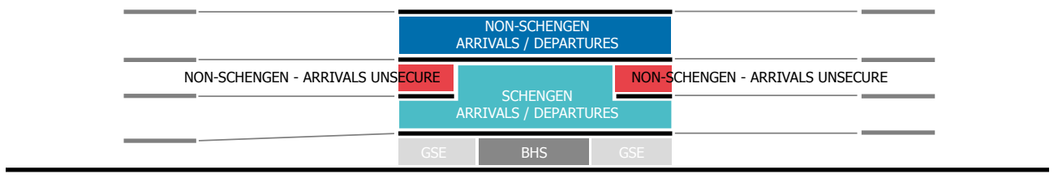
The extension of the north building is recommended to have clear zoning of functions, enabling future expansion to the east and west. This will meet future needs for changed modes of check-in, security control and increased traffic volumes beyond 13.8 million passengers per annum.



The diagram shows the existing terminal layout :

- 13 contact stands
- 5 remote stands

KEFLAVIK AIRPORT SEEN FROM SOUTH EAST



PIER NORTH SECTION

4.3.3 RE-MODELLING OF EXISTING TERMINAL

The construction of the new north terminal will be followed by the removal of check-in, baggage claim and central security from the existing building. The space vacated will provide expansion possibilities for commercial activities and baggage handling.

The area for commercial areas and baggage handling systems is sufficient to serve requirements beyond 13.8 million passengers per annum.

Maximising the size of the commercial zone in the central area close to the pier north with its many gates will help generate commercial revenue.

The strategy is to optimise the commercial area both on the departure level and on the arrivals level, with walk-through shopping areas in the main passenger flow.

The structure of the terminal will remain largely unchanged, while the south expansion completed in 2007 will be subject to some rebuilding. This new junction will connect the three levels of the new pier north with the existing levels in the terminal.

Since the gates in the existing north/south corridor connection are proposed to be replaced with new gates in pier north, more space is provided for a two-directional flow of passengers.

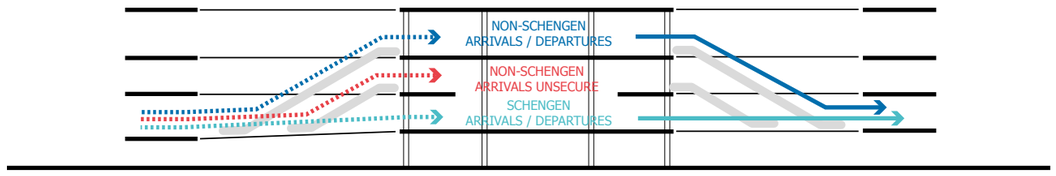
4.4 PIER NORTH

The traffic pattern at Keflavik Airport involves high peak numbers and shifts between Schengen and non-Schengen traffic, requiring highly flexible solutions.

The significant number of passengers travelling between Schengen and non-Schengen countries requires simple wayfinding and easy orientation to minimise transfer time.

The first pier north is proposed to be constructed with three passenger levels for full flexibility, serving both Schengen and non-Schengen passengers, and secure and non-secure arriving passengers at all gates.

In the centre part of the new pier north, a southward extension has been proposed. This will serve as a transfer centre housing all border control functions and transfer security. The extension will also contain vertical transportation and commercial areas on level 2 and level 4.



PIER NORTH SECTION / FLOW

TERMINAL AND AIRPORT CITY SEEN FROM NORTH

4.5 PHASING STRATEGY

The terminal has been developed with a clear phasing strategy in mind. It is foreseen that the extension can be built in stages that meet current demands of passenger traffic and satisfy requirements each time.

Development of the pier north to the east is proposed as the first phase of the terminal expansion. That development of the terminal in the first phase has minimal effect on the existing facilities on and near the apron.

4.6 FACILITY REQUIREMENTS

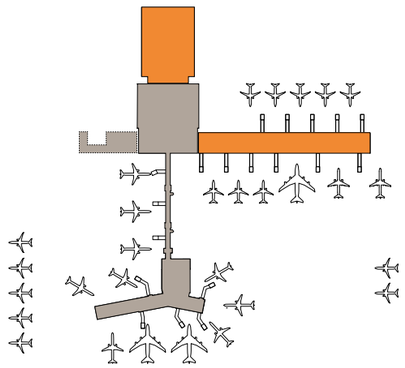
The facility planning proposed is based on IATA's Level of Service (LoS) C (optimum) for the year of completed construction and five years ahead. The IATA LoS C will be adapted to specific local requirements at Keflavik Airport.

4.7 GOODS AND WASTE MANAGEMENT

Goods and waste handling for the terminal is located at its east side. This area will be at basement level accessible by a service road. It can be partially or fully covered when a terminal extension so requires.

Heavy vehicle traffic relating to goods and waste management should branch off the main road system as early as possible to avoid mixing passenger traffic and service vehicles.

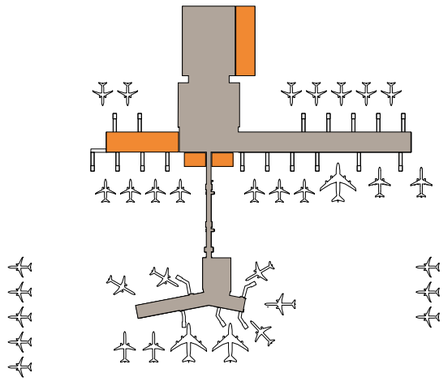
Adequate space will be reserved for waste management, providing the possibility to handle waste sorting and recycling properly in accordance with the Environmental Plan.



The diagram shows a terminal layout for:
- 8.5 MPPA / 60,000 movements

Pier extension
- 22 contact stands
- 7 remote stands

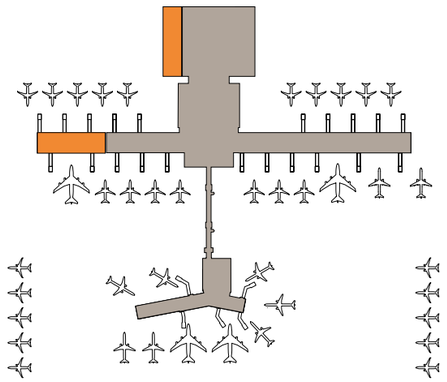
North extension
- 5 baggage claim belts



The diagram shows a terminal layout for:
- 10.6 MPPA / 65,000 movements

Pier extension
- 26 contact stands
- 8 remote stands

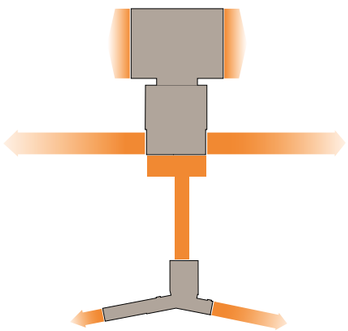
North extension
- 7 baggage claim belts



The diagram shows a terminal layout for:
- 13.8 MPPA / 86,000 movements

Pier extension
- 30 contact stands
- 10 remote stands

North extension
- 9 baggage claim belts



The diagram shows a terminal layout for 13.8 MPPA and beyond.

5.0
AIRPORT RELATED BUSINESS DEVELOPMENT

An "airport city" can be a future revenue-generating project benefiting the airport, its surrounding municipalities and Iceland as a whole.

5.1
AREA LAND USE

The airport area and surrounding areas provide opportunities for further development of the airport itself. With new technologies both in selling and manufacturing goods, coupled with growth in aviation, sites at or near a well-connected airport have become scarcer and more valuable worldwide. Many such areas are not available for development because of existing use and/or because the cities they serve have grown too close to the airport. This gives a competitive advantage for Keflavik Airport.

5.2
AIRPORT CITY

Like other major transport facilities, airports attract business that can be either directly or indirectly connected to their main function. Companies see value in international connections and the airport city's location. This includes airport-related businesses such as hotels or offices for operators at the airport. Businesses benefiting from close proximity to the airport, such as conference centres, exhibition centres, businesses relying on overseas connections or tourist and leisure adventure centres, could also see value in the location and development opportunities at Keflavik Airport. Such businesses will further expand their activities in the area, which in itself will sustain the airport city as a location and provide infrastructure that will in turn attract other non-aviation-related businesses.

KEFLAVIK AIRPORT NORTHERN DEVELOPMENT AREA

5.3
CARGO

Icelandic airlines are world leaders in the transport of fresh fish and have expertise in ensuring an unbroken cool chain for such products. With increased activity at Keflavik Airport and a growing number of destinations, the distribution grid from the airport becomes even stronger and more extensive - not only for passengers, but also for cargo. With increased international trade and just-in-time manufacturing, the opportunity to grow at a well-connected airport offers advantages to distribution operators.

Fish products being among Iceland's main exports, operators at the airport have acquired considerable know-how in servicing fresh fish exports to markets in Europe and the United States. As Iceland's fish stocks are a limited resource, the creation of more value per kilogram is of major importance. The airport can facilitate this by offering tailor-made solutions in accordance with best practices for the exporter, both airside and landside. As fresh fish is a perishable product, other such products may also come under the airport's focus in this regard with future opportunities in mind.

5.4
REMOTE LOCATIONS

Certain operations, especially warehousing, assembly and the production of goods, could derive value from proximity to the airport without having to be at the airport itself. Such operations could also draw value from the neighbouring industrial harbour, Helguvík, for example through imports by sea freight and distribution by air cargo. Businesses that do not need to be close to or within the airport perimeter and are not deemed necessary for its development could be located in such satellite areas, which could be developed in co-operation with neighbouring municipalities.

5.5
GENERAL AVIATION AND AVIATION/ AIRPORT SERVICES ON THE EAST APRON

The east apron is very suitable for smaller aviation-related enterprises such as FBOs, flight schools and smaller start-ups, as well as certain services requiring access to the airfield on an irregular basis, equipment maintenance, etc. The possibilities for future development at the east apron are very important for the airside operation. Areas just outside the fence are also available for development today and could play an important role in the future.

5.6
ACCESS

An airport being a transport facility, connections are at its core. This is vital for non-aviation related opportunities at and around the airport. With a good connection to Reykjavík's city centre, a high-speed train would provide opportunities for development at the airport. A short travel time to the country's business centre and seat of government would make the airport city well connected in terms of travel time from a national and international perspective. For the airport to reap its full value, connections to the four-lane highway to Reykjavik are of major importance. Good connections to the industrial harbour at Helguvík would also be valuable.

6.0
ENVIRONMENTAL PLAN

6.1
KEFLAVIK AIRPORT'S COMMITMENT TO GREEN DEVELOPMENT

With its time horizon up to the year 2040, the Environmental Plan maps out a framework to minimise the environmental impact of the airport's operations. The airport authorities strive to manage its growth whilst maintaining a balance between social, environmental and economic considerations for its neighbouring communities and Iceland as a whole.

Keflavik Airport plays a vital role for Iceland's economy and for the economic and social growth of local communities. The airport supports employment, tourism and leisure and contributes to a higher standard of living in Iceland.

Like all international airports, it has impacts on the local environment, including aircraft noise, effects on local air quality, waste handling and other effects. It is essential for the airport to minimise these impacts to ensure its sustainable operation and development, as well as to balance economic and social growth against them.

Many important steps have already been taken to minimise the airport's environmental impact. Further such steps are envisaged under the Masterplan.

Keflavik Airport operates in accordance with an environmental permit issued by the local environmental authority. To ensure continual improvement of our environmental performance, we are committed to a range of environmental monitoring and mitigation strategies, the outcomes of which are reported to the local environmental authority. This includes monitoring of noise, air emissions and water quality to obtain detailed data on the airport's environmental impact and to provide a scientific basis for future action.

Isavia operates and develops all airports in Iceland. It provides services both in the air and on the ground. Isavia's environmental policy sets out both the company's vision and its commitment to sustainability and environmental stewardship for Keflavik Airport and other airports in the country.

ISAVIA'S ENVIRONMENTAL POLICY:

- To manage our activities so as to minimise negative environmental impacts and ensure that our operations accord with the international standard ISO 14001 for environmental management, as well as seeking carbon accreditation

- To meet or surpass environmental legal requirements

- A commitment to efficient and sustainable use of resources, waste minimisation, increased recycling, reduced greenhouse gas emissions and greener procurement

- To improve our environmental performance through continuous monitoring and control of environmental risks

- To promote environmental awareness within the company and encourage progressive and eco-friendly solutions

- To publish information on our environmental performance regularly and encourage consultation with staff, operators, neighbours and other stakeholders

Our environmental policy reflects a commitment to sustainability and environmental excellence. The guiding principle for Keflavik Airport's development in 2015-2040 will be to develop and grow the business in a well-managed and sustainable manner, thereby optimising its economic and social benefits.

THE GUIDING PRINCIPLES FOR KEFLAVIK AIRPORT'S SUSTAINABLE DEVELOPMENT INCLUDE:

- Reusing and redeveloping as much of the existing airport infrastructure as possible, thereby saving resources, energy and money. This includes reusing or reconstructing the existing terminal, runways and taxiways to the extent possible, as outlined in our Masterplan.

- Designing flexible buildings fit for adaptive reuse - flexible for reconfiguration when change is needed and adaptive to accommodate major shifts in function. The aim is to create an infrastructure portfolio that can be adapted easily, efficiently and quickly to fit the needs of different activities whilst minimising the environmental impact.

- Taking environmental impacts into consideration when locating new structures, such as the new third runway. The new runway will be located near the terminal to minimise taxiing distances and away from settlements to minimise noise impact.

- Offering facilities for cargo, catering and ground handling as close to the terminal as possible to minimise transport distances, fuel use and CO_2 emissions.

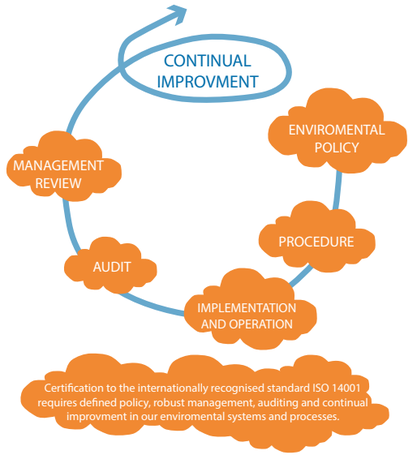
We will work step by step towards a green airport by minimising our environmental footprint.

6.2
ENVIRONMENTAL MANAGEMENT — KEY ENVIRONMENTAL ISSUES

We aim to adopt internationally acknowledged environmental management systems for our day-to-day activities and to ensure high-quality environmental practices.

Environmental considerations will inform all stages of Keflavik Airport's routine operations and development. We will ensure that the infrastructure is well designed and minimises adverse environmental effects. We support the use of the latest aircraft and aviation technology and encourage efficient aircraft operation on the ground. Our environmental management system will be a strong tool to ensure we have all measures in place to manage environmental impacts and to continuously improve the airport's environmental performance.

The basis of the environmental management system will be our Environmental Policy, whose key targets for the airport are ensuring a cleaner and quieter environment, reducing waste, limiting risk of spill and developing the airport in a sustainable way. Keflavik Airport is working to obtain ISO 14001 certification and Isavia is currently participating in a project entitled "Green Steps", which provides a framework to work systematically towards our environmental goals.


CONTINUAL IMPROVMENT
ENVIROMENTAL POLICY
PROCEDURE
IMPLEMENTATION AND OPERATION
AUDIT
MANAGEMENT REVIEW
Certification to the internationally recognised standard ISO 14001 requires defined policy, robust management, auditing and continual improvment in our enviromental systems and processes.

KEY ENVIRONMENTAL ISSUES ADDRESSED IN THE ENVIRONMENTAL PLAN INCLUDE:

- Noise from aircraft landings and take-offs, ground activities and road traffic

- Air quality affected by emissions from aircraft, ground service equipment, vehicles, etc.

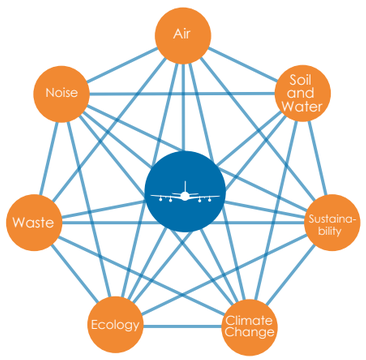
- The quality of surface water, groundwater and soil, including the risk of spillage from fuel storage and handling or impact from drainage of surface water, the use of chemicals for de-icing, firefighting, etc.

- Waste from the terminal, offices, aircraft catering and cleaning and aircraft maintenance, including hazardous wastes such as oil and chemicals

- Biodiversity and landscape values informing our decisions on the surroundings of Keflavik Airport, which is located in a lava field

- Climate change, with worldwide acceptance of the need to decrease emissions of CO_2 and other greenhouse gases in the fight against global warming

- Sustainable development, with focus on efficient use of raw materials and increased use of renewable energy.



We are strongly committed to noise reduction, clean air, soil and groundwater protection, waste limitation and eco-balanced future development to minimise climate change and maximise sustainability.

TARGET AND ACTION:

- We will operate in accordance with the international environmental management standard ISO 14001 to minimise the airport's negative environmental impact.

- We will enforce pollution control based on regular monitoring and reporting to ensure a clean environment, avoiding pollution in groundwater and drinking water and from the sewage system, as well as minimising air and noise pollution.

- We will work towards our Airport Carbon Accreditation.

6.3
NOISE — A QUIETER ENVIRONMENT

We aim to limit and reduce noise impact, with particular emphasis on limiting the number of people affected by noise from routine operations as well as construction.

Noise is one of the biggest environmental concerns of people living close to the airport. Aircraft and airport noise continues to be the number one environmental challenge for airports and is widely seen as the main obstacle to their growth.

The main sources of noise from Keflavik Airport are:
- Air traffic
- Ground traffic
- Testing of aircraft
- Construction work
- Use of APU (Auxiliary Power Unit used for powering aircraft standing on ground)

AIR TRAFFIC - Despite significant progress towards quieter aircraft in recent years, noise remains one of the main environmental impacts of Keflavik Airport - in particular, noise from taking off and landing - although studies have shown the airport's noise levels to be within acceptable levels for nearby residential areas.

For this Environmental Plan, noise calculations were prepared for all commercial flights in 2015 on the one hand and 2040 on the other hand.

The calculations for 2015 assume two existing runways and are based on the air traffic forecast for 2015. The traffic calculations for 2040 include the third runway as proposed in the Masterplan.

An airport's noise impact depends on several factors, including the number of aircraft movements, aircraft noise emission, aircraft speed, the flight profile and weather conditions. An aircraft's noise emission depends on the type of aircraft and its configuration. The take-off flight profile depends on the take-off weight, weather conditions and the operational procedure used.

The following two figures illustrate the noise exposure contours (Lden) calculated for expected air traffic movements in 2015 and 2040.

The Icelandic noise limits for air traffic under Regulation No. 724/2008 are outlined in the table below.

Area usage	Limit at building Lden	Limit at building LAF max 5% night	Inside building LA eq 24h
Residential buildings, dwellings and schools	55	80	30
Residential buildings, dwellings and schools in areas near already operating airport	65	90	30

NOISE LIMITS FOR AIR TRAFFIC

According to these calculations, noise levels within the municipality of Reykjanesbær to the east of the airport will be within the legal noise limits for areas close to an already operating airport both in 2015 and in the future year of 2040 (see illustrations below). Using the traffic forecast for 2040, the planned additional runway will increase the noise level in the undeveloped area west of the airport, but will not increase noise exposure significantly in the residential areas east of the airport. One way to develop the airport in the future without interfering with the soundscape of Keflavík town and other nearby residential areas is to locate any new runway west of the airport.

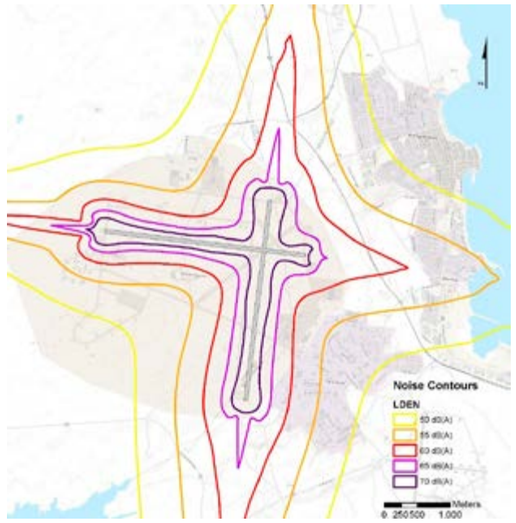


FIGURE SHOWS NOISE EXPOSURE CONTOURS (L) BASELINE 2015.

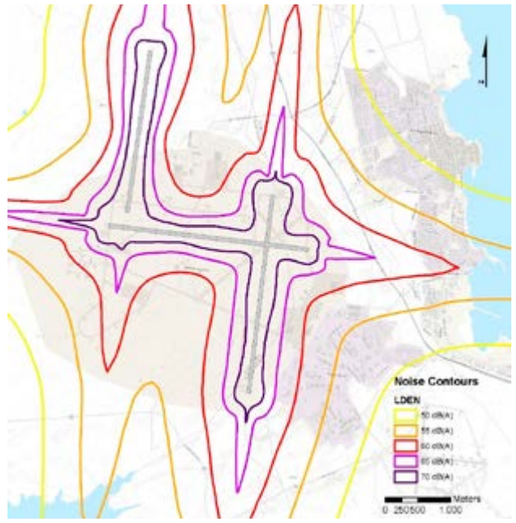


FIGURE SHOWS NOISE EXPOSURE CONTOURS (LDEN) FORECAST 2040.

A noise monitoring system will be brought into use at the airport. We will continue to develop our noise modelling to enable better understanding of the current and future planned operations. This will not only facilitate noise management on a day-to day basis, but also help develop appropriate mitigation measures and take account of future legislative requirements.

Noise at the eastern part of the airport is not expected to increase significantly in the next 25 years. Total commercial aircraft movements are forecast to increase from 34,300 in 2015 to 86,100 in 2040. However, the noise impact will be largely offset by bigger and newer aircraft types.

GROUND TRAFFIC NOISE - Noise from ground traffic is generated from tyre-pavement interaction, vehicle exhaust and engines. Increased road traffic between Keflavík and Reykjavík will result in increased noise levels, mainly in Reykjanesbær. To limit noise impact and emissions, the airport will support the use of public transport to and from the airport, e.g. by planning for space and access to public transport.

TESTING OF AIRCRAFT - Testing of aircraft during maintenance operations can cause considerable noise. Aircraft testing will be located away from nearby settlements to avoid noise impact.

APU - Auxiliary Power Units (APUs) are small jet engines in the tail of aircraft used to provide electrical power and cabin air conditioning while on the ground. To reduce noise, non-essential use of APUs at Keflavik Airport will be minimised, e.g. by providing alternative systems for these purposes for aircraft while on the ground.

CONSTRUCTION WORK - During the life of this environmental plan, several major construction projects will take place at the airport site. Noise sources during construction projects can for example include demolition, excavation, blasting and earthmoving. This noise impact will be minimised in co-operation with our contractors during construction work.

TARGET AND ACTION:

- We will locate future runways where it is possible to limit the noise impact on surrounding residential areas, e.g. by placing a possible new runway northwest of the existing airport.

- We will locate noise-generating activities such as testing of aircraft as far away as possible from Reykjanesbær and other nearby residential areas.

- We aim to minimise non-essential use of APUs.

- We aim to minimise noise impact from construction work in co-operation with our contractors.

- We will establish a noise monitoring system at the airport

6.4 AIR QUALITY — CLEAN AIR

Our air quality objective is to reduce emissions whenever possible, thereby improving air quality around the airport.

All airports must address air quality issues owing to the widespread use of fossil fuels in aircraft and vehicles and other fuel-burning equipment. Particulate matter from, e.g., studded tyres is also a pollutant in Iceland. Keflavik Airport is committed to working towards clean air and co-operating with airlines and other airport-related organisations to minimise air quality impacts.

While aircraft emissions are a major source of air pollution, we aim to minimise the impact on surrounding air quality through monitoring and management of ground emissions and emission-reducing measures.

The largest source of air pollutant emissions at the airport is aircraft exhausts. These occur during landings and take-offs, taxiing to and from gates and from the use of APUs to power aircraft on the ground. Other airport emissions include exhaust from ground service equipment and airport vehicles, fuelling operations and terminal restaurants. Airport-related activities outside the airport site also impact the local air quality. This includes road traffic to and from the airport in the form of passengers, supplies, freight and waste handling. Most of the airport's heating and cooling requirements are met by renewable energy sources – geothermal and hydropower.

Keflavik Airport aims to reduce emissions on the ground and improve the airport's environmental performance in the coming years despite steadily increasing air traffic. Possible mitigation measures include:

- Cutting emissions from aircraft taxiing and ground service vehicles by using a ground layout design that minimises travel distances within the airport;
- Using material coatings with catalytic properties to reduce NOX and VOC;
- Increasing the use of electric vehicles;
- Prohibiting the use of power-back (reverse engine thrust) to push back from gates;
- Encouraging single-engine taxiing;

TARGET AND ACTION:

- We aim to reduce emissions from our activities.

- We will plan for good public transport access by improving transport links to and from the airport.

- We are currently preparing to implement an air monitoring system around the airport and develop an air pollutant emission inventory.

6.5 POLLUTION CONTROL — CLEAN WATER AND SOIL

We are committed to preventing spills of oil and other chemicals into soil and groundwater and to implementing strict pollution control. We will also work to reduce the impact of sewage water and surface runoff from the airport.

Keflavik Airport is located high in the landscape, with surface and groundwater draining and flowing away from the airport area in almost all directions towards the nearby sea. Groundwater generated at the southeast part of the airport flows towards Reykjanesbær and Ásbrú on its way to the sea. The main extraction area for drinking water is at Lágasvæði to the southeast of the airport. Neither surface water nor groundwater generated at the airport will reach the drinking water resource at Lágasvæði, as shown in the figure below. The drinking water resource at Lágasvæði is well protected from contamination from the airport's activities. However, without proper pollution control, the airport's operations have the potential to affect the water quality of the surface water, local groundwater or nearby sea, causing impact on the ecological system or indoor climate in nearby buildings owing to ingress of pollutants from contaminated groundwater.

The storage of fuel and hazardous chemicals poses a potential risk of contamination of soil and groundwater. De-icing and firefighting training are other activities involving chemicals that are possible sources of contaminants. Keflavik Airport is committed to implementing strict measures and procedures to prevent contamination from the airport's activities and to identify and mitigate soil, surface water and groundwater contamination to the highest standards.

The key issues affecting the quality of soil and water at and around Keflavik Airport include:

- Wastewater discharge to the sea

- De-icing of aircraft and runways

- Firefighting and use of foam and chemicals

- Fuel storage and fuel handling.

WASTEWATER DISCHARGE TO THE SEA - The sewage system at Keflavik Airport is designed to meet all legal requirements. A mechanical wastewater treatment plant currently under construction is designed and sized for future development of the airport. Keflavik Airport is also planning to construct a new discharge pipe connecting the new treatment plant with the outlet. Untreated wastewater will potentially have an effect on the marine ecology, although the strong current at the coast will ensure a quick dilution in the seawater.

DE-ICING OF AIRCRAFT - De-icing of aircraft currently takes place at the stands or taxiways. The Masterplan proposes two new de-icing platforms to be constructed with bottom membranes, drains and systems for collection of fluids to prevent leakage of chemicals to the soil, surface water and groundwater: one de-icing platform close to taxiway E-4 and one in the area where taxiway K-3 crosses the parallel taxiway for the new runway.

FIREFIGHTING - The existing training area for firefighting is constructed with pavement for preventing leakage of chemicals into the ground. The training area is planned to be updated to improve the collection system even further.

FUEL STORAGE AND HANDLING - A fuel facility is currently located just north of the western end of taxiway S-3. The airport has not had any serious oil spills from the storage and handling of jet fuel. The extended fuel farm will be constructed using appropriate environmental protection, including secondary containment to capture any possible oil leakage from the tanks. In case of emergency, or when oil is handled exceptionally outside areas with oil separators or retention basins, an emergency vehicle with appropriate equipment to handle small or larger oil spills is always on site.

RUNWAY AND TAXIWAY DRAINAGE - The airport will undertake a study to identify the capacity of the drainage system and the control system. Procedures will be included in the airport's environmental management system for monitoring and controlling the oil separators. The airport will locate the best disposal sites for ice and debris from runways and taxiways where the water can drain to retention basins. This might limit the risk of sudden releases of contamination from melting snow or debris.

TARGET AND ACTION:

- We are constructing a mechanical wastewater treatment plant that complies with regulations and is designed and sized for future development.

- We are constructing a new sea outlet for the wastewater treatment plant and will use the existing outlet as an emergency outlet.

- We will prevent de-icing fluids from entering the groundwater or sewage system and construct two separate sites for de-icing of flights.

- We continue to use oil separators to ensure collection of small oil spills from normal operations.

- We will install retention basins for collection and trapping of larger oil spills.

- We will improve the collection of run-off from runways and taxiways to prevent accidental oil spills or de-icing chemicals from entering the soil or groundwater.

- We will ensure that future construction of fuel storage and fuel transport systems complies with up-to-date standards for environmental protection, including secondary containment.

- We will work to preserve our freshwater and groundwater quality.

6.6
WASTE — REUSE AND RECYCLE

We aim to implement procedures to prevent and reduce waste and increase reuse and recycling.

Keflavik Airport generates and manages large quantities of waste from its own operations and from the activities of passengers and business partners.

The total amount of municipal waste generated in the terminal is estimated to have been approximately 850 tonnes in 2014. About 80% of this quantity is generated in the North Terminal and 20% in the South Terminal. A large majority of the waste is unseparated waste, which is incinerated, with only a minor share recycled or reused.

Keflavik Airport is installing a waste management system to increase reuse and recycling of waste. Waste separation bins have been placed at several locations at the airport and more will follow. Waste separation is already under way at the company's offices and will be extended to the Passenger Terminal and to subcontractors. The overarching aim is to minimise waste and maximise recycling.

Operators at Keflavik Airport do generate some hazardous waste from oil separators, cleaning and maintenance of its vehicle fleet and aircraft. The airport works continuously to decrease the use of chemicals and improve the handling of chemicals needed in the operations. When possible, chemicals are substituted with more environmentally friendly materials, and the airport's service partners are encouraged to do the same.

The use of commodities with Eco labels will be increased, and the airport's subcontractors will be encouraged to do the same.

TARGET AND ACTION:

- We will work towards more and improved waste separation, which should enable us to increase waste recycling and reuse.

- We will put up more separation waste bins in the terminal area and other areas if needed.

- We will encourage subcontractors to reuse construction waste from the airport's development.

- We will encourage our subcontractors to limit the use of hazardous waste as much as possible, and wherever possible to substitute it with more environmentally friendly materials.

- Actions will be configured towards minimising waste.

- We will increase the use of commodities with Eco labels and encourage our subcontractors to do the same.

6.7
ENSURING BIODIVERSITY AND PROTECTING LOCAL HERITAGE

We aim to limit the airport's ecological footprint, minimise changes in the landscape and respect the cultural heritage.

Historical and cultural remains can be seen all over the Reykjanes Peninsula. Keflavik Airport is dedicated to limiting its impact on the region's ecology, landscape and cultural heritage both in its day-to-day activities and in future development of the airport.

ECOLOGICAL VALUE - There are few vegetation species in the area, and their distribution is sparse. Collisions between aircraft and birds pose a threat to aviation safety. Keflavik Airport applies ICAO-recommended methods to manage wildlife in the area and will continue to do so. The airport acknowledges that impacts and disturbance on bird behaviour in the area are already present owing to the existing airport and aviation activities. Increased air traffic and the construction of new buildings, aprons, runways, etc., will cause additional local disturbance.

LANDSCAPE VALUE - The existing airport and runways have visual impact on the surrounding areas and can be seen from several nearby residential areas. However, locating the additional runway to the north-west of the terminal building is expected to limit the change in the visual impact. The design of new structures is also of importance for the airport's visual impact.

HERITAGE VALUES - An archaeological survey has shown that there are several cultural remains close by Keflavik Airport.

TARGET AND ACTION:

- We will limit the impact on the surrounding lava field by minimising the requirement for additional new land.

- We will undertake ecological and archaeological surveys where new areas are required for the airport's development.

- We will co-ordinate construction on new land with Icelandic administering authorities and institutions.

6.8
CLIMATE CHANGE AND SUSTAINABILITY

We aim to continuously reduce emissions of carbon dioxide (CO_2) from Keflavik Airport operations.

Aviation is responsible for a small (estimated at 2%) but growing share of global greenhouse gas emissions. In an Icelandic context, Keflavik Airport is an important contributor to CO_2 emissions. Although the airport uses carbon-neutral electricity and heat generated from renewable sources, it still has many sources of CO_2. These derive in large part from aircraft and the reduction of these emissions depends chiefly on international standards and agreements. However, we can help minimise emissions from aircraft on the ground, for example by reducing the use of APUs. We can control emissions from vehicles and ground equipment used on the site and encourage the development of low-carbon transport for our partners and passengers.

The aim is for Keflavik Airport's future energy use and vehicle fuel to be carbon-neutral.

By planning runways and taxiways carefully, we can limit ground travel of both aircraft and vehicles and reduce fuel consumption considerably. By planning our new buildings to meet international green building standards of, for example, BREEAM or LEED, we will reduce energy needs and increase sustainability.

The main source of CO_2 emissions over which we have control is the use of fossil fuels in airport vehicles and ground service equipment. We will ensure that our vehicles meet fuel efficiency standards and are well maintained.

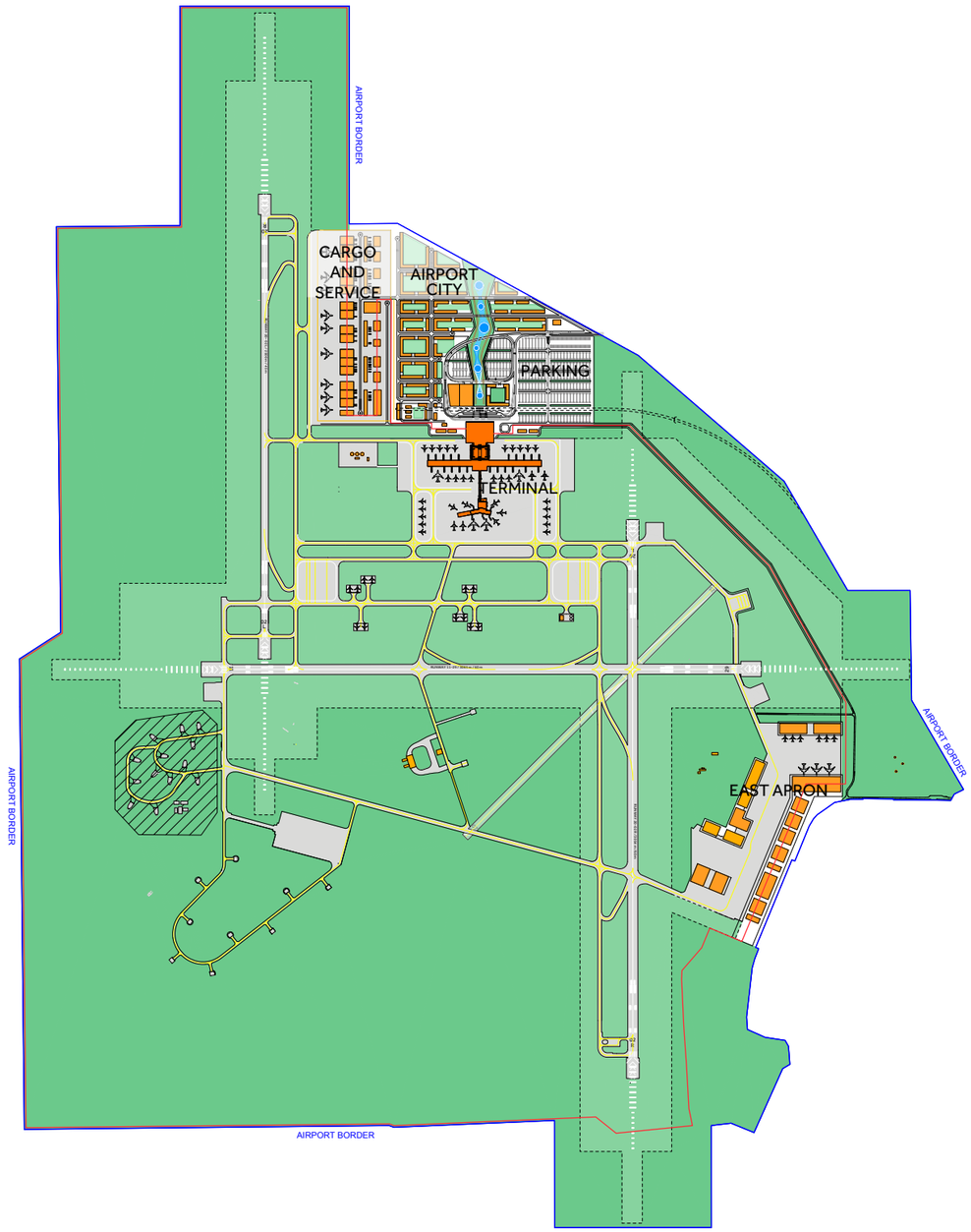
TARGET AND ACTION:

- We aim to limit CO_2 emission from our activities.

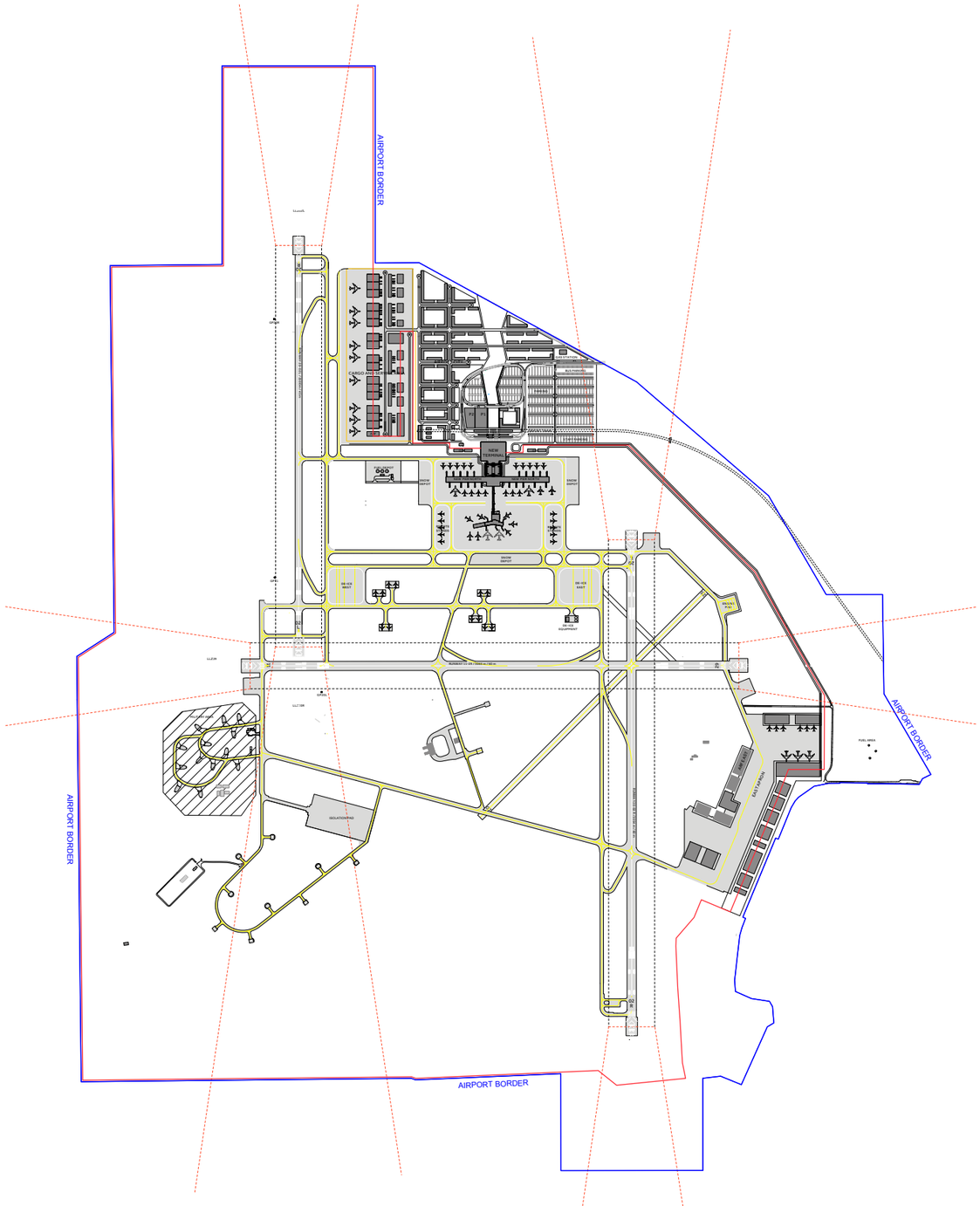
- We will encourage our contractors to use sustainable principles in major construction works.

- We will develop a CO_2 inventory and work towards Airport Carbon Accreditation.

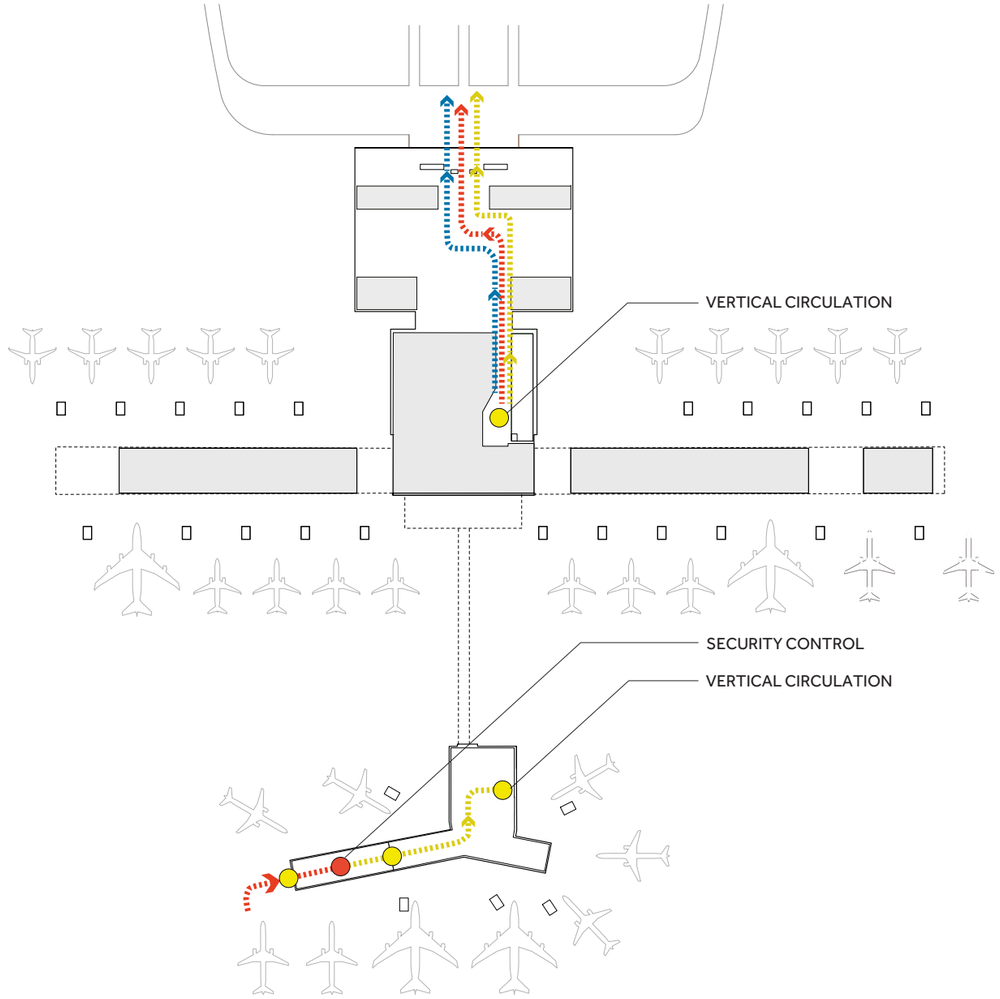
7.0
DRAWINGS



KEFLAVIK AIRPORT 2040 LAND USE PLAN



KEFLAVIK AIRPORT 2040 RWY/TWY PLAN

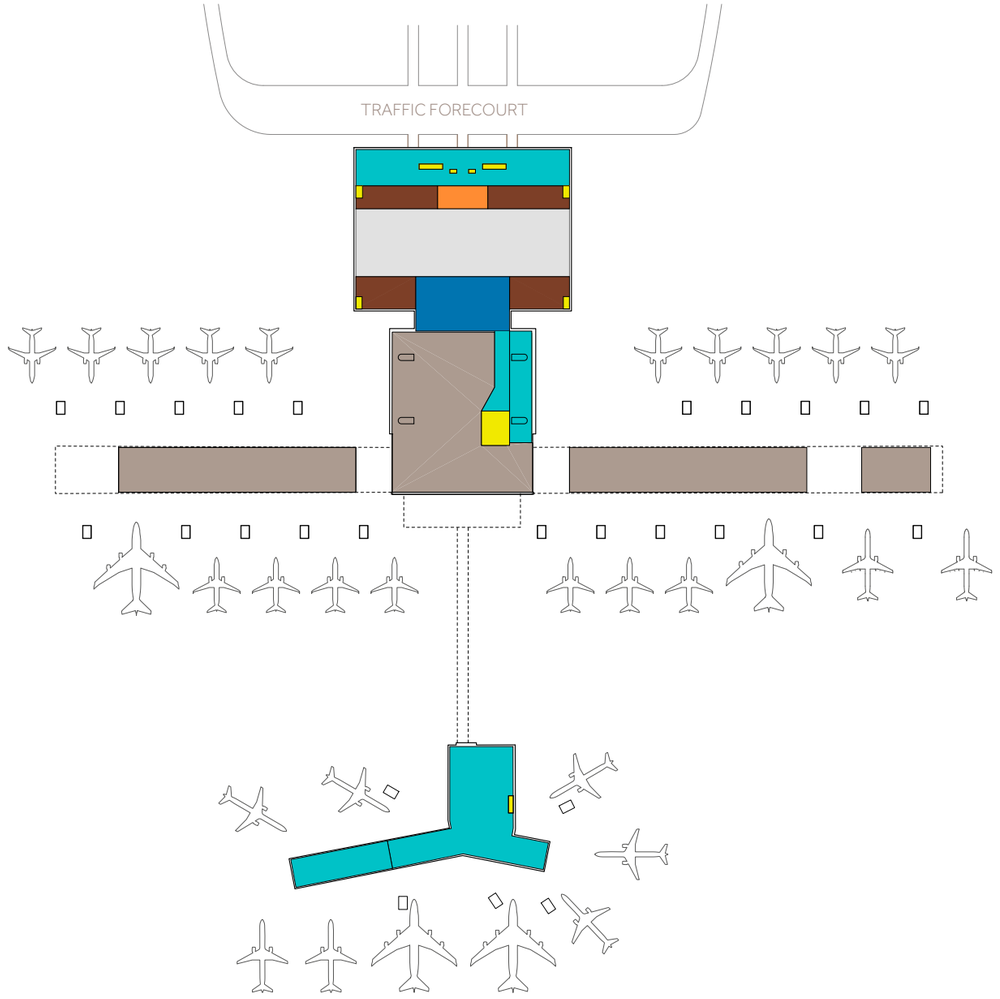


LEGEND

- Arrivals SCHENGEN
- Departures SCHENGEN
- Arrivals Non- SCHENGEN secure
- Depatures Non- SCHENGEN
- Arrivals Non- SCHENGEN Unsecure

TERMINAL PLAN / LEVEL 01

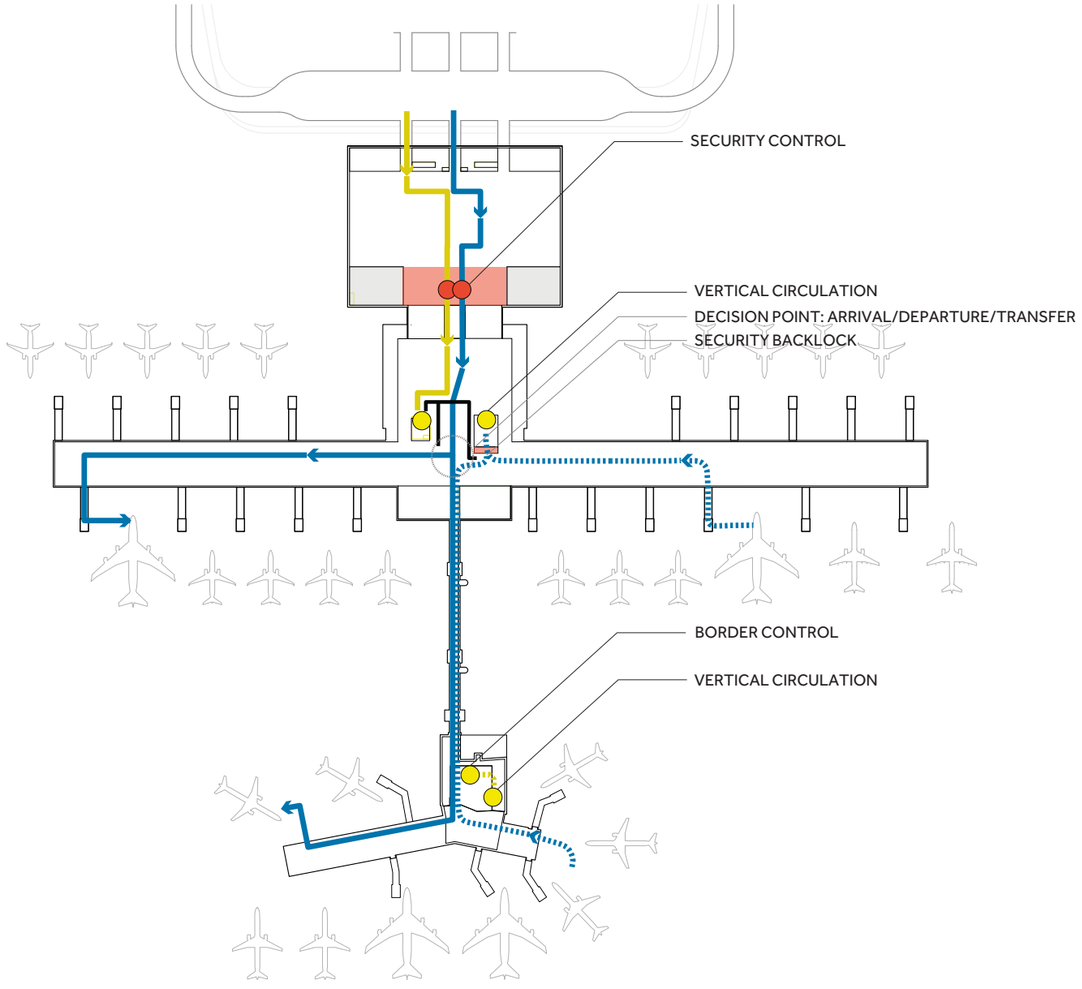
FLOW



- SERVICE AREAS
- TERMINAL AREAS
- CUSTOMS
- DUTY FREE
- SECURITY
- VERTICAL CIRCULATION
- BAGGAGE CLAIM
- BHS

TERMINAL PLAN / LEVEL 01

FUNCTIONS

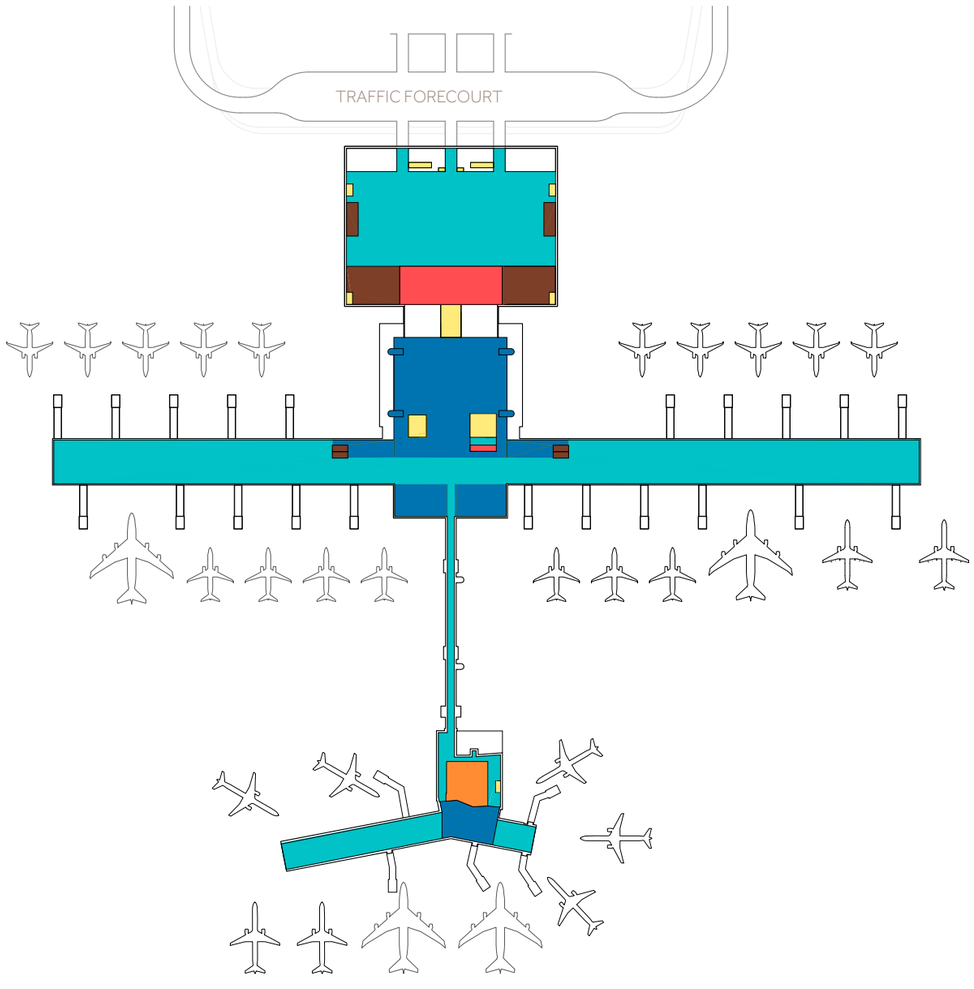


LEGEND

- Arrivals SCHENGEN
- Departures SCHENGEN
- Arrivals Non- SCHENGEN secure
- Depatures Non- SCHENGEN
- Arrivals Non- SCHENGEN Unsecure

TERMINAL PLAN / LEVEL 02

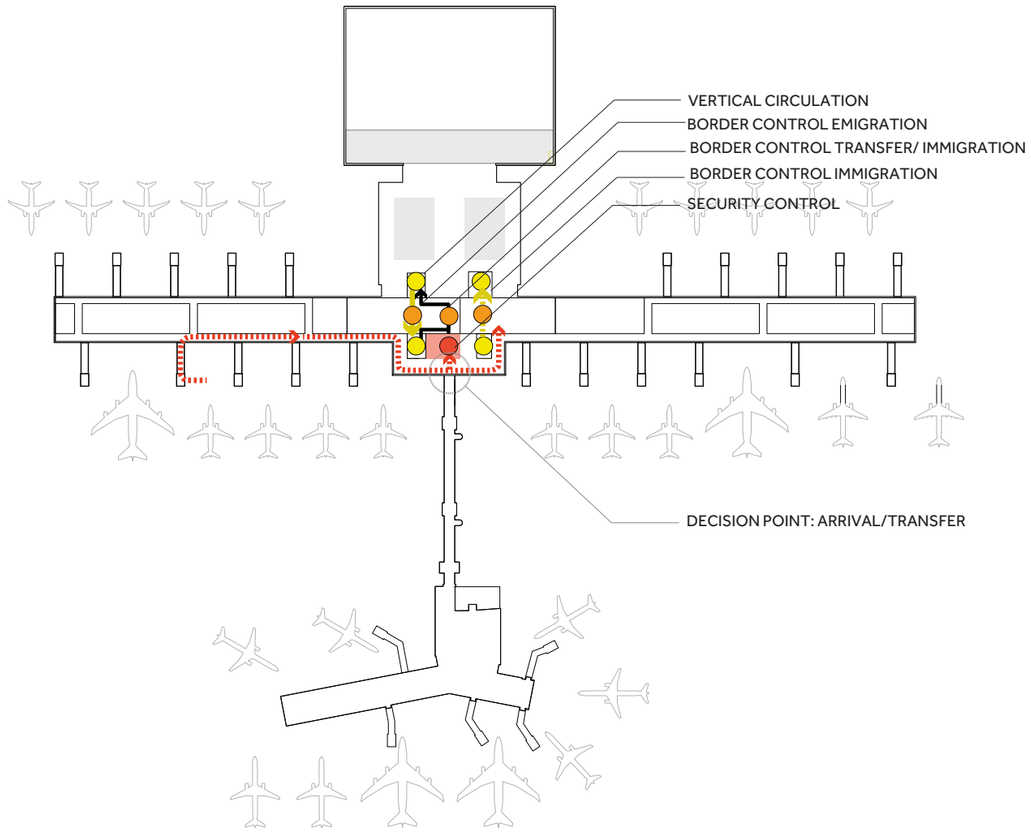
FLOW



- SERVICE AREAS
- TERMINAL AREAS
- BORDER CONTROL
- COMMERCIAL AREAS
- SECURITY
- VERTICAL CIRCULATION

TERMINAL PLAN / LEVEL 02

FUNCTIONS

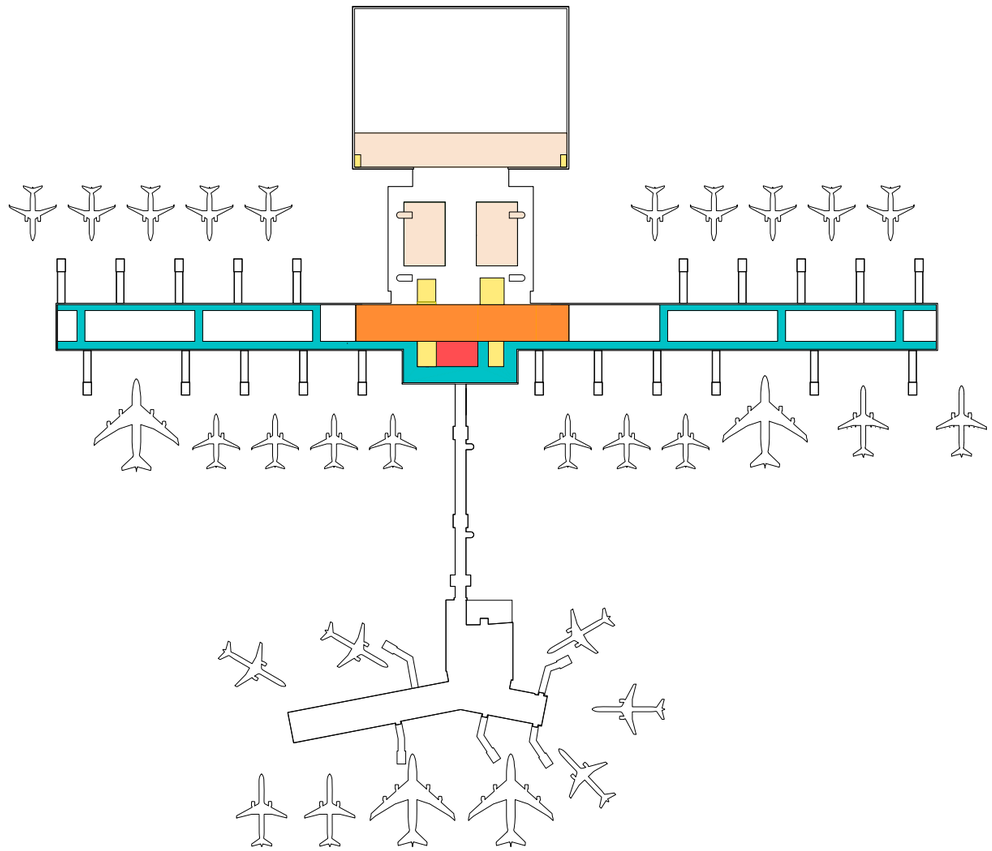


LEGEND

- Arrivals SCHENGEN
- Departures SCHENGEN
- Arrivals Non- SCHENGEN secure
- Depatures Non- SCHENGEN
- Arrivals Non- SCHENGEN Unsecure

TERMINAL PLAN / LEVEL 03

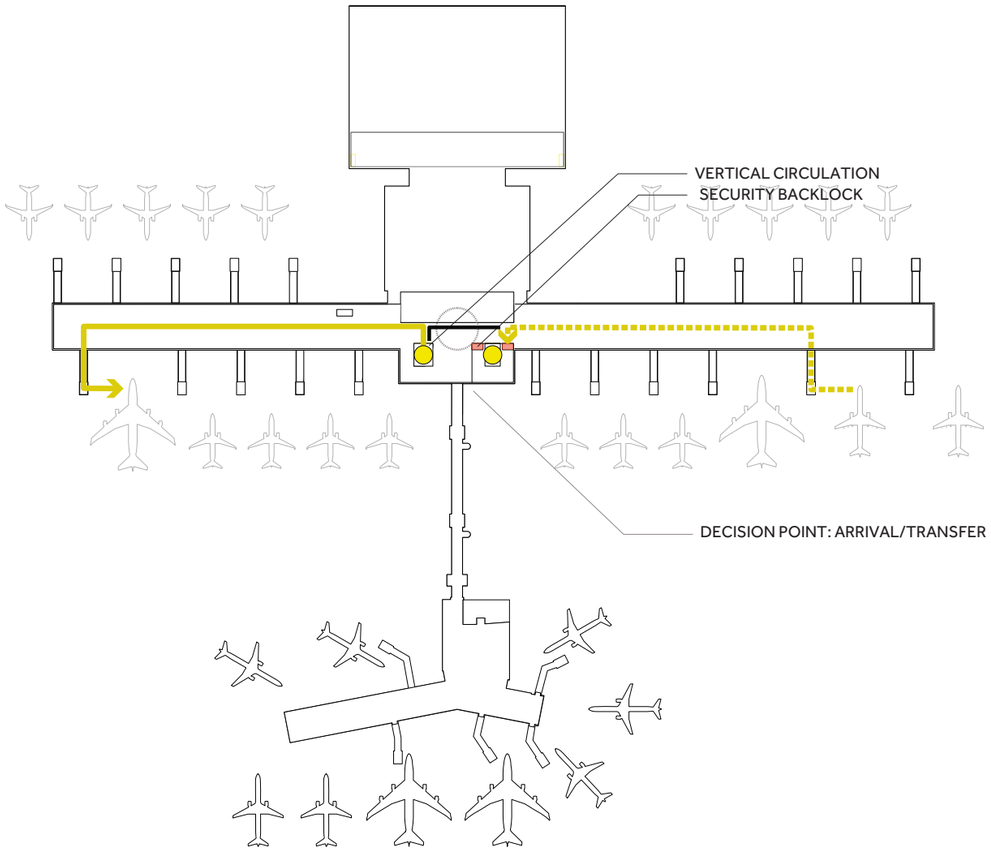
FLOW



- OFFICES
- TERMINAL AREAS
- BOARDER CONTROL
- SECURITY
- VERTICAL CIRCULATION

TERMINAL PLAN / LEVEL 03

FUNCTIONS

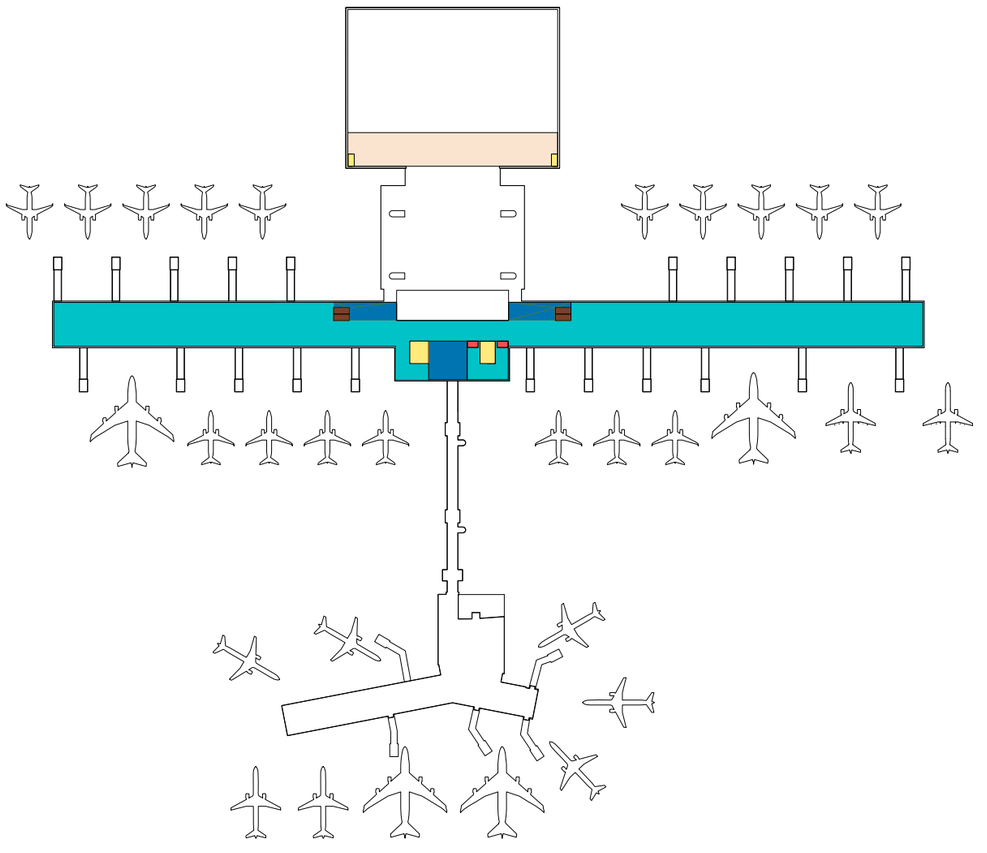


LEGEND

- Arrivals SCHENGEN
- Departures SCHENGEN
- Arrivals Non- SCHENGEN secure
- Depatures Non- SCHENGEN
- Arrivals Non- SCHENGEN Unsecure

TERMINAL PLAN / LEVEL 04

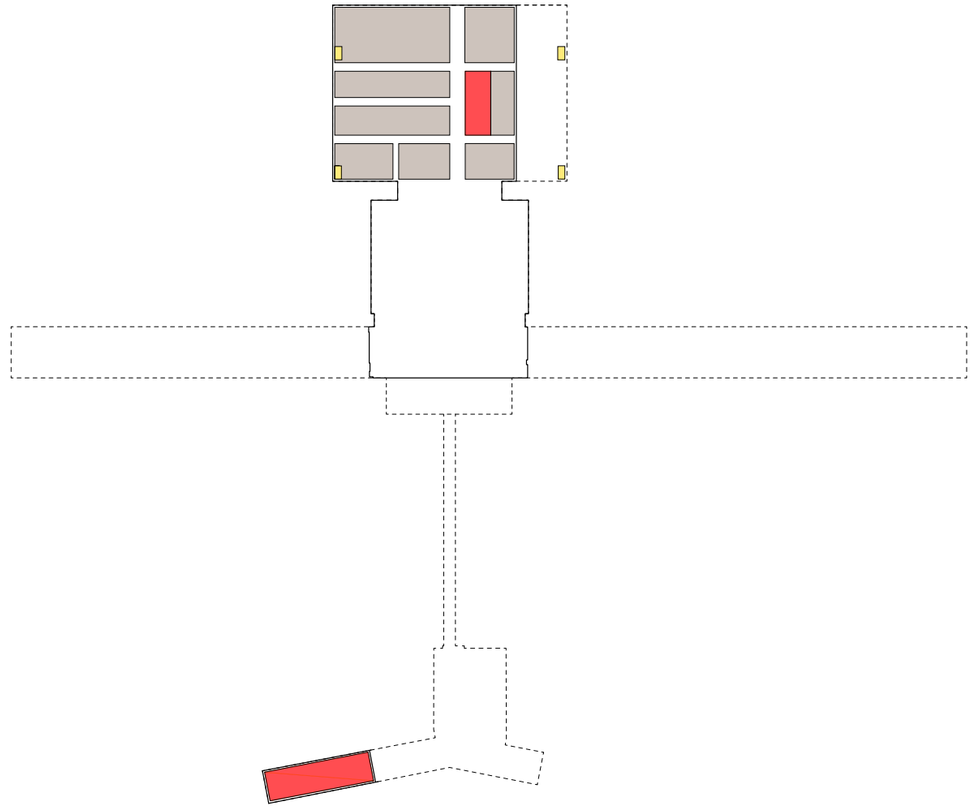
FLOW



- OFFICES
- SERVICE AREAS
- TERMINAL AREAS
- BOARDER CONTROL
- COMMERCIAL AREAS
- SECURITY
- VERTICAL CIRCULATION

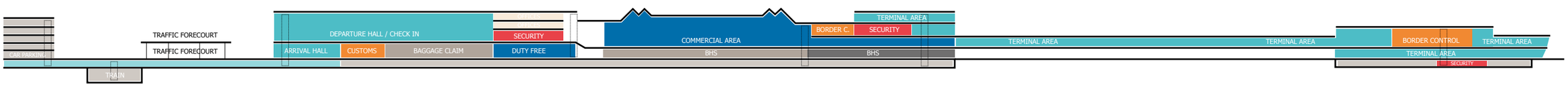
TERMINAL PLAN / LEVEL 04

FUNCTIONS



TERMINAL PLAN / LEVEL -01

FUNCTIONS



TERMINAL SECTION

FUNCTIONS

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